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The South Australian Naturalist

The Journal of the Field Naturalists' Section of the Royal Society of South Australia.

Adelaide

VOL. VIII.,



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The authors of papers are responsible for the facts recorded and opinions expressed.

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EXCURSIONS.

December 11—Outer Harbor. Train, 1.35 p.m. Dredging. Leaders, Messrs. Baker and Hale.

1927.

February 5—Outer Harbor. Train, 1.35 p.m. Dredging. Leaders, Shell Club.

March 5—Outer Harbor. Train, 1.35 p.m. Dredging. Leaders, Prof. H. Johnston and Mr. B. Beck.

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No. 1.

The death of Mr. E. S. Hughes removes from our Section a gentleman whose kindly manner and genuine kindness had endeared him to everyone. In our society as in other societies with which he was connected he was a very valued member. His services on the General Committee were recognized by his appointment as Chairman of the Section. His experience in public life and especially as chairman or president of various societies gave added value to his kindly advice.

WILD FLOWER EXHIBITION.

The Seventh Annual Exhibition was held in the Adelaide Town Hall on the 15th and 16th October, 1926. The display of flowers from this State was excellent and came from many different centres. The schools contributing were as follows:—Aldgate, Ashbourne, Basket Range, Birdwood, Bordertown, Burrungul, Charleston, Cherry Gardens, Crafers, Hermitage, Hindmarsh Tiers, Hindmarsh Valley, Houghton, Kangaroo Flat, Kersbrook, Mt. Compass, Mylor, Myponga, Naturi, Ngapala, Owen, Paracombe, Pt. Lincoln, Quorn High, Quorn Primary, Sedan, Stirling East, Upper Sturt, Uraidla, Williamstown. The following also sent flowers:—Miss B. Howie, Blackwood; A., G. and J. Forbes, Aldgate; L. M. and G. Ising; Mr. Edwin Ashby, Blackwood; Mr. W. Burdett, Basket Range; Mr. A. K. Newbery, Mt. Lofty; Mrs. L. E. Page, Myponga; Mrs. B. M. Dodd, Myponga; Miss Alice Bourke for Mr. Bourke, Melrose; Poltalloch Ranger Co., Girl Guides, Mrs. K. D. Bowman, Captain; Messrs. Hackett Ltd.; Mr. W. Tilling, Mylor for Mr. J. F. Bailey; Mr. W. J. Kimber, Black Hill; Mr. J. A. Hogan, from Kingston Park; Prof. J. B. Cleland from Kinchina and Sandergrove.

Fodder plants were received from:—Mr. L. Reese, Minnie Downs; Mr. F. D. Warren, Finnis Springs, Marree; Messrs. W. T. Brown and Son, Eurelia; Angorichina Pastoral Co., Blinman; Mr. I. J. Warnes, Wahroonga, Burra; Poltalloch Ranger Co. Girl Guides, Poltalloch and Ashville; Misses E. N. White and R. Woods, Quorn.

The competition in the schools' collections resulted in the prizes being awarded by Mr. J. M. Black to the following:—1. Quorn Primary; 2. Birdwood; 3. Stirling East; 4. Naturi; 5. Myponga; 6. Basket Range.

Mr. W. J. Hill, Rose Park, forwarded some quondong fruit and Mr. E. H. Ising exhibited specimens of *Eucalyptus Isingiana*, Maiden, a small mallee collected at Immarna on the Trans. Railway.

Interstate flowers were received from the Naturalists' Society, New South Wales; Field Naturalists' Club, Queensland; Field Naturalists' Club, Messrs. Steedman and G. F. Berthoud, West Australia.

The following sub-committees made displays:—SCIENTIFIC CLASSIFICATION.—Messrs. J. M. Black, J. F. Bailey, Dr. R. S. Rogers, Prof. J. B. Celand, Mesdames J. M. Black, Elliott, Misses A. Simpson, J. M. Murray, M. Roeger, Hurcombe.

MASSED DISPLAY.—Mrs. B. B. Beck, Convener.

PAINTING COMPETITION.—Mr. W. Champion Hackett, Convener; Mrs. Gwen Barringer, Judge. Oils; First and Second prizes.—Mrs. Tamblyn. Watercolours: First prize.—Miss Evelyn E. Grey; Second prize—Miss Nora Colliver.

POND LIFE.—Convener, Mr. J. E. Machell, who made an exhibit on behalf of the Nature Study Laboratory, Education Department and consisted of several jars with freshwater living specimens of tadpoles, boatman, etc.

BIRDS.—Mr. F. E. Parsons exhibited a number of bird skins, eggs, etc. and gave talks on them during the session.

INSECTS, BUTTERFLIES, ETC.—The Board of Governors of the Public Library loaned a large number of cabinet drawers of butterflies, moths, beetles, etc. under the charge of Mr. N. B. Tindale.

NATIVE FISHES AND PLANTS. The South Australian Aquarium Society made an exhibit of native and other fishes and plants. Those who assisted were Messrs. J. W. Goodale, H. M. Hale, B. B. Beck, T. W. Nettelbeck and R. Carpenter.

SHELLS AND FOSSILS. The Shell Collectors' Club, of the Section made an exhibit of shells and fossils, etc. and those who contributed specimens were Messrs. W. J. Kimber (who also gave talks during the Session), F. Trigg, Rev. H. A. Gunter, E. F. Rosewarne, F. L. Saunders and R. Pulleine.

MINERALS.—Mr. E. A. S. Thomas, Convener, showed a number of specimens. The Paltalloch Ranger Company Girl Guides (Mrs. K. D. Bowman, Captain) exhibited a large number of specimens from Keith district.

FUNGI.—Prof. J. B. Cleland, Convener, showed a large collection of fungi; bacteria, etc. A large number of specimens of the ephemeral flora were shown in different ways.

MICROSCOPES.—Dr. R. Pulleine, Convener.

Messrs. W. J. Webb and W. A. Harding showing many slides of microscopic objects which proved very interesting.

SEAWEEDS.—Miss E. D. Macklin, B.Sc., Convener, exhibited a fine series of the green, red and brown seaweeds in water and also dried specimens.

MOSSES AND LICHENS.—Mr. T. B. Paltridge, Convener. A comprehensive range of these plants and their allies was shown.

NATIVE TIMBERS.—The S. A. Woods and Forests Department through the Conservator (Mr. E. Julius) and Mr. Jenkins, made an exhibit of forest products including tables and cabinets. Mr. A. J. Wiley exhibited a large number of articles turned from Australian timbers. Mr. E. A. S. Thomas exhibited a drawer made of various native timbers. The Section exhibited a series of timber samples donated by the various State Forestry Departments.

WEEDS.—The Department of Agriculture lent a number of weeds grown in pots, each plant being labelled.

FLOWER SALES.—Miss E. Hocking, Convener. Local flowers sold well and although waratahs and boronia arrived from Sydney after the Show they were disposed of to advantage.

LANTERN LECTURES.—Mr. G. Beck very kindly lent a lantern and operated it for the following lecturers:—Mr. T. P. Bellchambers, "Wild Life at Humbug Sanctuary"; Mr. H. M. Hale, "In the Northern Flinders Range"; Dr. R. H. Pulleine, "Trapdoor Spiders"; and Mr. J. F. Bailey, "Australian Vegetation."

GENERAL.—The Committee heartily thank the following for valuable assistance rendered:—The Right Honorable the Lord Mayor (Mr. Wallace Bruce) for the loan of the Town Hall and organ and for opening the Exhibition; Dr. R. S. Rogers for naming the orchids; Mrs. E. S. Paterson, 22 Currie Street, for loan of "Sulphur Stone" from Italy; Mr. W. R. Knox for giving an organ recital; Messrs Savery's Ltd., for the use of a piano; Master J. Croft for exhibiting a shark's egg; Mr. W. J. Webb for taking charge of all parcels received; Mr. Tillett for ticket writing; Mrs. A. Day for acting as doorkeeper and Treasurer, and to all those who helped in various ways.

PROCEEDS. The net profit will amount to about £22. This will be devoted chiefly to the printing of our journal, "The South Australian Naturalist" and enlarging its scope. Assistance will be given to the Herbarium and to the Library, etc.

NAMED FLOWERS. Three large tables were filled with specimens scientifically arranged in families, each specimen showing its correct botanical name. About 200 species were so dealt with most of them also showing the locality from which they came.

THE PLANTS OF KINCHINA AND MONARTO SOUTH.

By E. H. Ising, J. B. Cleland and J. M. Black.

Monarto South is 51 Miles from Adelaide by rail and 9 miles from Murray Bridge (60 miles). Kinchina is a siding between these two stations and about 4 miles beyond Monarto South. Our attention was first directed to the advantages afforded by Kinchina as a collecting ground by Mr. J. Sutton, whose ornithological work there is so well known. In a later contribution, we hope to describe the plant ecology of this region on the confines of the "Murray Scrub." The present paper is an enumeration of the plants so far identified by us within walking distance of Monarto South and of Kinchina. All may be found within the few hours allowed during a day excursion from Adelaide. The number of vascular plants for the district will probably be materially added to as further investigations are made. Most of the collecting has been done by one of us (J.B.C.), a second member (E.H.I.) has collected on several occasions and the third (J.M.B.) has identified a number of the plants and has confirmed or corrected the identification of those species about which the other two members may have had any doubt. The lost *Acacia rhigiophylla* has been found again and an introduced South African grass (*Pentaschistis airoides*) new for the State, has been discovered. We are indebted to Dr. R. S. Rogers for identifying, or for confirming the identification of the orchids. *Microtis oblonga*, a Victorian species hitherto only recorded for Myponga in this State, has now been found at Kinchina. This list comprises 326 species of plants with 17 varieties in addition, of which 275 and the 17 varieties are indigenous to the State and 51 are introduced (indicated by an asterisk).

FILICALES.—*Cheilanthes tenuifolia*, Swartz; *Notholaena Brownii*, Desv.; *Pleurosorus rutifolius*, (R.Br.) Fee; *Ophioglossum coriaceum*, A. Cunn.

PINACEAE.—*Callitris robusta*, R.Br.; *C. verrucosa*, R.Br.—occasional shrubs in sandy soil.

SCHEUCHZERIACEAE.—*Triglochin calcitrapa*, Hook; *T. centrocarpa*, Hook.

GRAMINEAE.—*Themeda triandra*, Forsk; *Panicum effusum*, R.Br.; *P. gracile*, R.Br.—amongst rocks; *Amphipogon strictus*, R.Br.; *Stipa elegantissima*, Labill.—often growing in the midst of shrubs, Oct.; *S. setacea*, R.Br.; *S. semibarbata*, R.Br.; *S. falcata*, Hughes, Nov.; *S. variabilis*, Hughes, Oct.; *Calamagrostis filiformis* (Forst.) Pilger; *Dichelachne sciurea* (R.Br.) Hook, f.; **Aira cary-*

ophyllea, L.; **Pentaschistis airoides* (Nees) Stapf.; a S. African species, Oct.; *Danthonia carphoides*, F.v.M.; *D. penicillata* (Labill.) F.v.M.; *Pappophorum nigricans*, R.Br.; *Triodia irritans*, R.Br.; **Koeleria phleoides*, Pers.; **Briza minor*, L.; *Poa caespitosa*, Forst.; **Festuca bromoides*, L.; **Bromus madritensis*, L.; *Lolium subulatum*, Vis.; *Lepturus incurvatus*, Trin.; *Agropyrum scabrum* (Labill.) Beauv.; **Hordeum murinum*, L.

CYPERACEAE.—*Cyperus vaginatus*, R.Br.; *Gahnia lanigera* (R.Br.), Benth.; *G. deusta* (R.Br.) Benth.; *Lepidosperma concavum* (*viscidum*), R.Br.; *L. laterale* (*viscidum*), R.Br.; *L. carphoides*, F.v.M.

RESTIONACEAE.—*Hypolaena fastigiata*, R.Br.

JUNCACEAE.—*Juncus pauciflorus*, R.Br.

LILIACEAE.—*Dianella revoluta*, R.Br.; *Anguillaria dioica*, R.Br.; *Lomandra dura*, (F.v.M.) Ewart; *L. effusa* (Lindl.) Ewart; *L. filiformis*, (Thunb.) J. Britt.; *L. glauca* (R.Br.), Ewart.; *L. juncea* (F.v.M.) Ewart; *L. leucocephala* (R.Br.) Ewart.; *Thysanotus Patersonii*, R.Br.; *Th. Baueri*, R.Br.; *Caesia vittata*, R.Br., Oct.; *Bulbine semibarbata*, (R.Br.) Haw., Oct.; *Dichopogon fimbriatus* (R.Br.) J. M. Black.

AMARYLLIDACEAE.—*Hypoxis pusilla*, Hook. f, Oct.; *Calostemma purpureum*, R.Br.

IRIDACEAE.—**Moraea xerospatha*, MacO.

ORCHIDACEAE.—*Thelymitra aristata*, Lindl., Oct.; *Th. longifolia*, Forst., Oct.; *Th. pauciflora*, R.Br., Oct.; *Th. antennifera*, Hook. Monarto S.; *Microtis oblonga*, Rogers (Nov. '24.); *Acianthus exsertus*, R.Br., Aug.; *Cryptostylis reniformis*, R.Br., Aug.; *Caladenia dilatata*, R.Br.; *C. filamentosa*, R.Br., Monarto S. (Rogers); *C. filamentosa* var. *tentaculata*, (Tate) Rogers; (Rogers); *C. reticulata*, Fitz.; *C. deformis*, R.Br., Monarto S., Sep.; *Diuris palustris*, Lindl.; *D. maculata*, Sm., Oct.; *Pterostylis nana*, R.Br., Aug.; *Pt. reflexa*, R.Br., Aug.; *Pt. cycnocephala*, Fitz.; *Pt. pusilla*, Rogers; Oct.; *Pt. Mitchellii*, Lindl., Oct.; *Pt. barbata*, Lindl.

CASUARINACEAE.—*Casuarina stricta*, Ait.; *C. paludosa*, Sieb., (probably, in the opinion of Miss Macklin.).

URTICACEAE.—*Parietaria debilis*, G. Forst.; *Urtica urens*, L.

PROTEACEAE.—*Hakea ulicina*, R.Br., var. *flexilis*, F.v.M.; *Banksia ornata*, F.v.M.; *Grevillea ilicifolia*, R.Br.; *G. lavandulacea*, Schl.; *G. lavandulacea*, var. *sericea*, Benth.

SANTALACEAE.—*Exocarpus cupressiformis*, Labill.; *E. spartea*, R.Br.; *E. aphylla*, R.Br.; *Choretrum glomeratum*, R.Br.; *Fusanus acuminatus*, R.Br.; *F. persicarius*, F.v.M.

POLYGONACEAE.—*Rumex Brownii*, Campd.; **Polygonum aviculare*, L.; *Muehlenbeckia adpressa*, (Labill.) Meisn.

CHENOPODIACEAE.—*Rhagodia crassifolia*, R.Br. (?); *Rh. nutans*, R.Br.; *Chenopodium carinatum*, R.Br.; **Ch. murale*, L.; *Atriplex semibaccatum*, R.Br.; *A. Muelleri*, Benth.; *Salsola Kali*, L.; *Enchylaena tomentosa*, R.Br.

AMARANTACEAE.—*Trichinium alopecuroideum*, Lindl.

AIZOACEAE.—*Mesembrianthemum aequilaterale*, Haw.

PORTULACACEAE.—*Calandrinia volubilis*, Benth.; *C. calyptrata*, Hook. f., Oct.; *C. pygmaea*, F.v.M., Oct.; *C. corrigioloides*, F.v.M., Oct.

CARYOPHYLLACEAE.—*Sagina apetala*, Ard., sepals and capsule valves 4 or 5; **Stellaria media*, L.; *Spergularia rubra*, (L.) J. et C. Presl.; *Polycarpon tetraphyllum*, Loefl.; **Silene nocturna*, L. Oct.; **S. gallica*, L.; *Scleranthus minusculus*, F.v.M., Oct.

RANUNCULACEAE.—*Clematis microphylla*, DC.

LAURACEAE.—*Cassytha glabella*, R.Br.; *C. melantha*, R. Br.

PAPAVERACEAE.—**Papaver aculeatum*, Thunb., Oct.; **P. Rhoeas*, L., Oct.; **P. hybridum*, L., Oct.; **Fumitaria muralis*, Sond.

CRUCIFERAE.—**Sisymbrium orientale*, L., Aug.; *Blennodia cardaminoides*, F.v.M., Aug.; **Diplotaxis muralis*, L.; *Alyssum linifolium*, Steph.; *Lepidium hyssopifolium*, Desv.; *Stenopetalum lineare*, R.Br.; *S. lineare*, var. *canescens*, Benth.; *S. sphaerocarpum*, F.v.M.

DROSERACEAE.—*Drosera glanduligera*, Lehm., Oct.; *D. Whittakeri*, Planch.; *D. Planchonii*, Hook. f.

CRASSULACEAE.—*Crassula colorata* (Nees) Ostenf., Oct.; *C. Sieberiana* (Schul.) Ostenf., Oct.; *C. macrantha* (Hook. f) Diels et Pritzel, Oct.

PITTOSPORACEAE.—*Pittosporum phillyreoides*, DC.; *Bursaria spinosa*, Cav.; *Cheiranthra linearis*, A. Cunn.; *Billardiera cymosa*, F.v.M.

ROSACEAE.—*Acaena ovina*, A. Cunn.

LEGUMINOSAE.—*Acacia microcarpa*, F.v.M., Oct.; *A. microcarpa*, F.v.M., var. *linearis*, J. M. Black, phyllodes 2mm. broad; *A. brachybotrya*, Benth.; *A. argyrophylla*, Hook., Oct.; *A. ligulata*, A. Cunn.; *A. pycnantha*, Benth., July, Aug.; *A. calamifolia*, Sweet, Aug., a beautiful delicate shrub, growing well from seed on the Adelaide plains and a handsome garden shrub; *A. Bynoeana*, Benth.; *A. colletioides*, A. Cunn.; *A. rhigiophylla*, F.v.M.; recorded in Black as having been found by Baron von Mueller in 1848 in scrub between Mt. Barker and R. Murray and not collected since in this State. Our collecting brought it to light again at Kinchima,

where it is common in a restricted locality and which is possibly the spot where von Mueller collected it. *A. sclerophylla*, Lindl.; *A. rigens*, A. Cunn., Oct.; *A. Menzeli*, J. M. Black, near Monarto S.; *A. rheticocarpa*, J. M. Black; *A. spinescens*, Benth.; *Pultenaea densifolia*, F.v.M.; *Cassia Sturti*, R.Br.; *C. eremophila*, A. Cunn.; *C. eremophila* var. *platypoda*, Benth.; *Eutaxia microphylla* (R.Br.) J. M. Black; *Dillwynia uncinata* (Turcz.) J. M. Black; **D. hispida*, Lindl., Monarto S.; **Trifolium procumbens*, L.; **T. tomentosum*, L.; **T. glomeratum*, L.; **T. arvense*, L.; **Melilotus indica*, All.; **Medicago denticulata*, Willd.; **M. confinis*, Koch.; **M. minima*, (L.) Grufb.; *Lotus australis*, Andr.; *Psoralea patens*, Lindl., amongst rocks; *Glycine clandestina*, Wendl.

GERANIACEAE.—*Geranium pilosum*, Forst, probably var. *australe*, Ostenf.; *Erodium cygnorum*, Nees; **E. botrys*. (Cav.) Bertol.

OXALIDACEAE.—*Oxalis corniculata*, L.

LINACEAE.—*Linum marginale*, A. Cunn.

ZYGOPHYLLACEAE.—*Zygophyllum crenatum*, F.v.M., Oct., along the railway line.

RUTACEAE.—*Boronia caerulea*, F.v.M.; *Correa rubra*, Sm.; *Phebalium bullatum*, J. M. Black; *Ph. pungens*, Benth.

POLYGALACEAE.—*Comesperma volubile*, Labill., Oct.

EUPHORBIACEAE.—*Poranthera microphylla*, Brongn.; *Beyeria Leschenaultii*, (DC.) Baill; *B. Leschenaultii* (DC.), Baill. var. *rosmarinoides*, Baill.; *Bertya Mitchellii*, (Sond.) Muell. Arg.

STACKHOUSIACEAE.—*Stackhousia linariaefolia*, Cunn.; *S. monogyna*, Labill.

SAPINDACEAE.—*Dodonaea viscosa*, L.; *D. hexandra*, F.v.M.; *D. cuneata*, Sm.; *D. attenuata*, A. Cunn.

RHAMNACEAE.—*Pomaderris racemosa*, Hook.; *P. obcordata*, Fenzl.; *Spyridium subochreatum*, F.v.M.; *Sp. parvifolium*, F.v.M.; *Sp. eriocephalum*, Fenzl.; *Cryptandra tomentosa*, Lindl.; *C. amara*, Smith; *C. leucophracta*, Schlecht.

STERCULIACEAE.—*Lasiopetalum Behrii*, F.v.M., Monarto S.; *L. Baueri*, Steetz.

DILLENIACEAE.—*Hibbertia stricta*, R.Br., var. *glabriuscula*, Benth., Monarto S.; *H. stricta* var. *canescens*, Benth., Monarto S.; *H. virgata*, R.Br., var. *crassifolia*, (Benth.) J. M. Black, Monarto S.; *H. fasciculata*, R.Br., Monarto S.

VIOLACEAE.—*Hybanthus floribundus*, F.v.M.

THYMELAEACEAE.—*Pimelea serpyllifolia*, R.Br.; *P. stricta*, Meisn.; *P. flava*, R.Br.

MYRTACEAE.—*Calythrix tetragona*, Lab.; *Baeckia crassifolia*, Lindl. (pedicels longer than leaves); *B. Behrii*, F.v.M.; *Leptospermum coriaceum*, Cheel, in sandy soil; *Melaleuca uncinata*, R.Br.; *M. acuminata*, F.v.M.; *M. pubescens*, Schau.; *Eucalyptus angulosa*, Schau.; *E. conglobata*, R.Br.; *E. calycogona*, Turcz.; *E. dumosa*, A. Cunn.; *E. fasciculosa*, F.v.M.; *E. gracilis*, F.v.M.; *E. leptophylla*, F.v.M.; *E. leucoxylon*, F.v.M., and var. *macrocarpa*, J. E. Brown, Oct., along water-courses, flowers red or cream-coloured, very handsome; *E. odorata*, F.v.M.; *E. oleosa*, F.v.M. (*E. transcontinentalis*, Maid.); *Callistemon rugulosus*, D.C.

HALORRHAGIDACEAE.—*Halorrhagis elata*, Cunn., Kinchina, Monarto S.; *H. heterophylla*, Brongn.; *Loudonia Behrii*, Schl., Oct.

UMBELLIFERAE.—*Hydrocotyle medicaginoides*, Turcz.; *H. callicarpa*, Bunge; *H. pilifera*, Turcz.; *Didiscus pusillus*, F.v.M., Oct.; *D. cyanopetalus*, F.v.M., Oct.; *Daucus glochidiatus* (Labill.) Ostenf.

EPACRIDACEAE.—*Brachyloma ericoides*, Sond.; *Astroloma conostephioides*, (Sond.) F.v.M.; *A. humifusum*, (Cav.) R.Br. var. *denticulatum* (R.Br.) J. M. Black; *Leucopogon cordifolius*, Lindl.; *L. sp.*; *L. rufus*, Lindl.; *Acrotriche depressa*, R.Br.; *A. cordata*, (Labill.), R.Br.

PRIMULACEAE.—**Anagallis arvensis*, L.; **A. femina*, Mill.

LOGANIACEAE.—*Logania linifolia*, Schlecht.

GENTIANACEAE.—*Sebaea ovata*, R.Br., Oct., plants very small.

ASCLEPIDIACEAE.—**Asclepias fruticosa*, L.

CONVOLVULACEAE.—*Convolvulus erubescens*, Sims.

BORRAGINACEAE.—*Halganea cyanea*, Lindl., Oct.; *Lappula concava*, F.v.M.; *Mysotis australis*, R.Br., Oct.

LABIATAE.—*Prostanthera eurybioides*, F.v.M., Oct., leaves very fragrant; *P. Behriana*, Schlecht, Monarto S.; *P. aspalathoides*, A. Cunn.; **Marrubium vulgare*, L., Horehound; **Salvia Verbenaca*, L., Monarto S.; *Westringia Dampieri*, R.Br.

SOLANACEAE.—**Solanum nigrum*, L.; *S. simile*, F.v.M., Oct.; **Lycium ferocissimum*, Miers.

SCROPHULARIACEAE.—**Bartsia latifolia*, Sibth.; *Veronica distans*, R.Br.

MYOPORACEAE.—*Myporum platycarpum*, R.Br.

PLANTAGINACEAE.—*Plantago varia*, R.Br.; **P. Coronopus*, L.

RUBIACEAE.—*Opercularia varia*, R.Br.; *Asperula scoparia*, Hook. f., Oct.; *Galium Gaudichaudii*, DC.

CUCURBITACEAE.—**Cucumis myriocarpus*, Naud.; **Citrullus vulgaris*, Schrad.

CAMPANULACEAE.—*Wahlenbergia gracilis*, DC., as the usual-sized form and as a very small form with the flowers nearly white.

GOODENIACEAE.—*Dampiera rosmarinifolia*, Schlecht., Oct., the usual deep-blue form and another a rich deep pinkish; *Velleia paradoxa*, R.Br.; *Goodenia varia*, R.Br.; *G. geniculata*, R.Br., a handsome plant; *G. geniculata*, var. *erriophylla*, Benth.; *G. pinnatifida*, Schlecht.

STYLIDIACEAE.—*Levenhookia Sonderi*, F.v.M., Oct.

COMPOSITAE.—*Olearia pimeleoides*, Benth. var. *minor*, Benth.; *O. glutinosa*, Benth., Oct.; *O. ramulosa*, Benth., var. *microphylla*, Benth.; *O. lepidophylla*, Benth.; *O. picridifolia*, Benth.; *Vittadinia australis*, A. Rich.; *Calotis hispidula*, F.v.M.; *Brachycome ciliaris*, Less.; *B. goniocarpa*, Sond. and F.v.M.; *B. melanocarpa*, Sond. and F.v.M.; *B. pusilla*, Steetz; *B. pachyptera*, Turcz. Aug.; *Cotula coronopifolia*, Linn.; *C. australis*, Hook. f.; *Isoetopsis graminifolia*, Turcz., Oct.; *Angianthus strictus*, Benth., Oct.; *Calocephalus Drummondii*, Benth., Oct.; *Gnaphalodes uliginosum*, A. Gray; *Graspedia Richea*, Cass., Oct.; *Chthonocephalus pseudewax*, Steetz, Aug.; *Cassinia spectabilis*, R.Br.; *Ixodia achilleoides*, R.Br.; *Toxanthus Muelleri*, Benth., Oct.; *Rutidosia Pumilo*, Benth. Oct.; *Millotia tenuifolia*, Cass.; *Podotheca angustifolia*, Cass., Sept., Oct.; *Leptorrhynchus elongatus*, DC.; *L. squamatus*, Less.; *Helichrysum leucopsidium*, DC., Oct.; *H. Tepperi*, F.v.M., Oct.; *H. apiculatum*, DC., ordinary and dwarf forms; *H. semipapposum*, DC.; *H. obtusifolium*, Sond. and F.v.M.; *Helipterum laeve*, Benth., Oct.; *H. exiguum*, F.v.M., Oct.; *H. pygmaeum*, Benth.; *H. australe* (A. Gray), Ostenf., Oct.; *H. Jessenii*, F.v.M., Oct.; *Gnaphalium luteo-album*, Linn; *Stuartina Muelleri*, Sond., Oct.; *Erechthites quadridentata*, DC.; *E. prenanthoides*, DC.; *Senecio laetus*, Forst.; *S. odoratus*, Hornem.; *Cymbonotus Lawsonianus*, Gaudich; *Microseris scapigera* (Forst.), Sch. Bip.

COMPOSITAE (Introduced).—*Inula graveolens*, Desf.; *Cryptostemma calendulaceum*, R.Br.; *Carduus tenuiflorus*, Curt.; *Hedypnois cretica*, Willd.; *Hypochaeris radicata*, L.; *H. glabra*, L.; *Picris hieracioides*, L. var. *squarrosa*, Benth.; *Urospermum picroides*, Desf.; *Sonchus oleraceus*, L.; *S. asper*, Hill.

**NATIVE BURIAL AT PEDLER'S CREEK,
SOUTH AUSTRALIA.**

By Norman B. Tindale.

On a recent visit to the mouth of Pedlers Creek, north of Port Willunga and some 25 miles south of Adelaide, a native grave was discovered in the sandhills, about one hundred yards south of the creek and a quarter of a mile from the coast. A sandhill several hundred yards wide and about sixty feet high is being blown away by the wind, exposing former native camp sites and burials. Several burials, including one of a child have been destroyed by weathering but the example noted herein was in better condition. When first noticed only the ends of the long bones and the vault of the skull were exposed above the sand; alongside it lay two hammer stones (Pl. i, fig. 1). As may be seen in the figure great numbers of flint chippings lay scattered about on the site, derived no doubt from the upper layers of the sand hill.

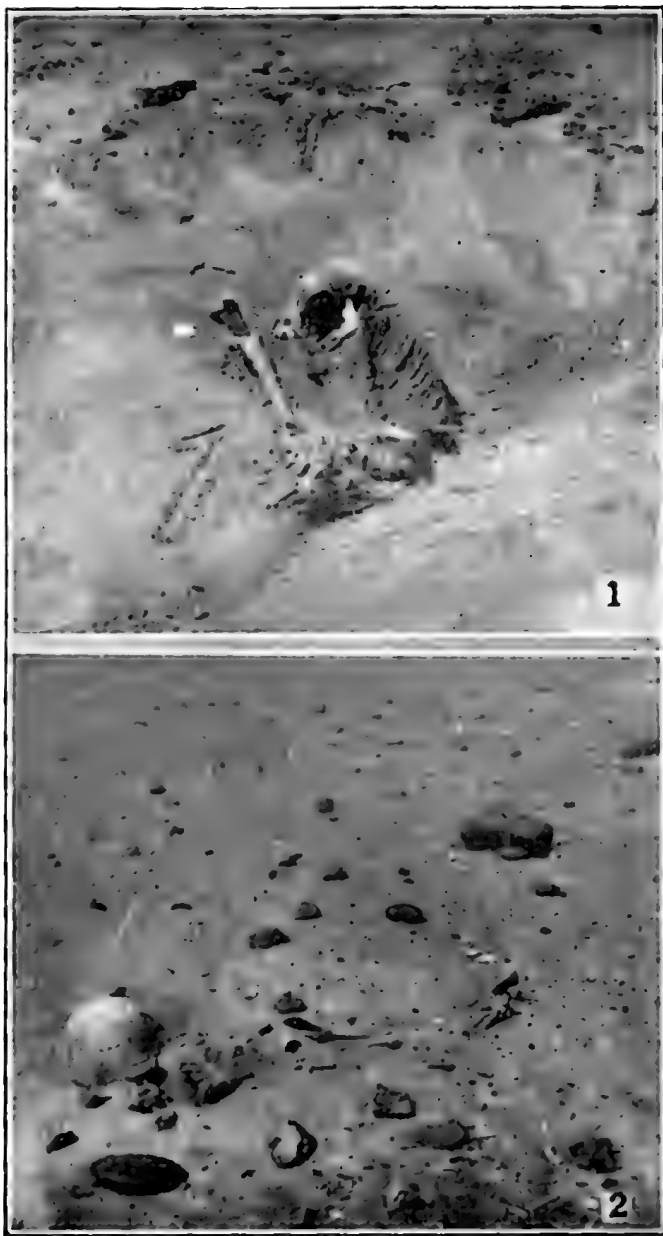
On removing the sand it was seen that the remains, probably those of a male of middle-age, lay on the right side with the knees and arms doubled up to the chin; so that the fingers were in front of the face. The orientation of the body was in a West-nor'-westerly direction (in the figure, plate i, fig. 2 the arrow points a little West of North). The right tibial bone was broken when unearthed; all the bones were fragile and only the skull proved sufficiently strong for transport. It is now in the South Australian Museum collection.

From the quantities of stone chips about and the size of the sandhill, it may be inferred that the burial was not of recent date.

The smaller hammer stone (pl. ii, fig. 1) is of the usual type picked up on camp sites in the vicinity; it bears marks of use at each end and in two places on each flat face. The larger stone, which measures 100 mm. in length, 62 mm. in width and 26 mm. in thickness is of very dense quartzite. Besides the usual marks at the ends and faces there is a pair of marked depressions on each face near the centre, the left indentation being higher up than the right on each side; the pair on the hidden face are only slightly deeper and larger than those shown. I can at present offer no explanation for their presence and similarity; it is evident they are the results of use over an extended period of time.

Explanation of Plates.**Plate i.****Fig. 1.—Position of burial at Pedlers Creek.****Fig. 2.—Site of native burial at Pedlers Creek.****Plate ii.****Fig. 1.—Two hammer stones from Pedlers Creek.**

Plate i.



Native grave at Pedlers Creek.

Plate ii.



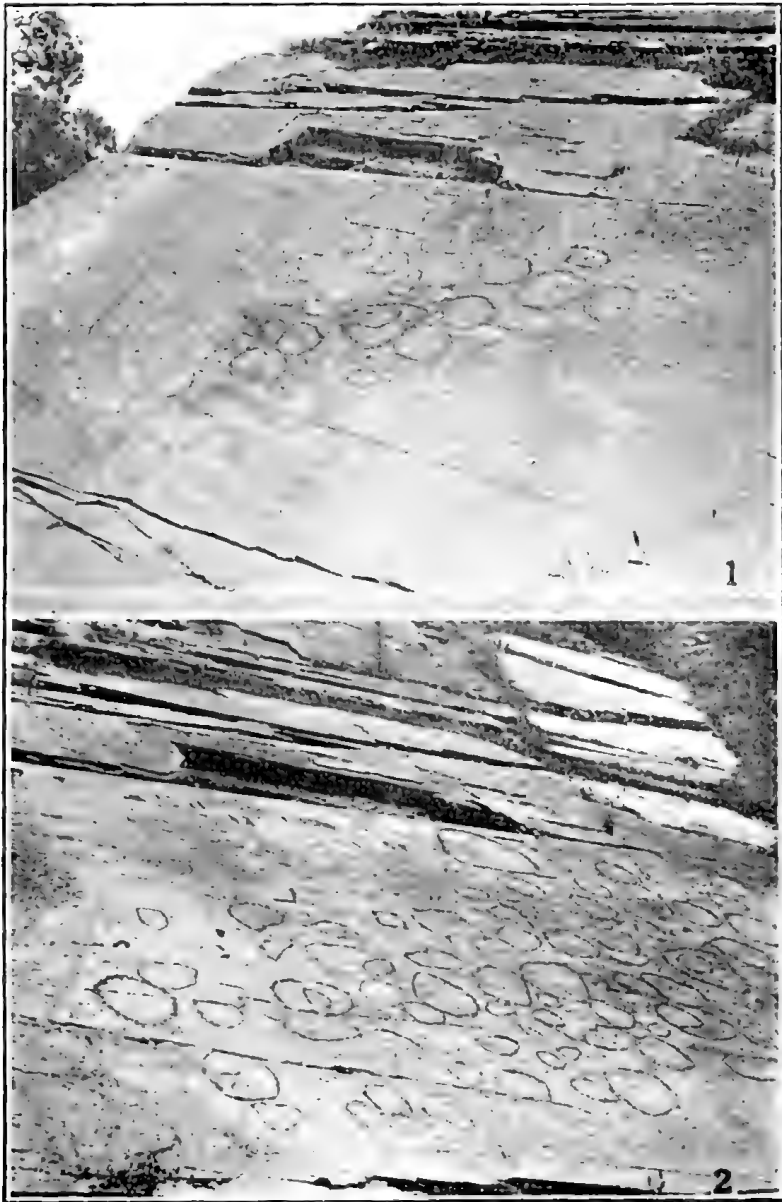
Pounding stones from Pedlers Creek and site of burial ground
at Adelaide.

Plate iii.



Native grave at Adelaide.

Plate iv.



Rock carvings at Orroroo.

SOME ABORIGINAL GRAVES AT ADELAIDE, SOUTH AUSTRALIA.

By Herbert M. Hale.

On August 13th, 1914, workmen engaged in digging loam in the River Torrens valley at the rear of the Zoological Gardens unearthed two human skeletons. A visit was at once made to the locality (plate ii, fig. 2). At this place the river makes a right-angled bend and then curves towards the Frome Road bridge. The burial ground is situate on the upper terrace of the right bank, immediately above this elbow of the stream; the recently constructed War Memorial Drive now passes within a few feet of the spot. The skeleton of an adult Adelaide aborigine, and the bones of an unborn, or newly born, baby were in one of the opened graves; the other grave contained the skeleton of a male. A third skeleton was found in the vicinity, not far from the two which had been disturbed; the soil was carefully cleared away from the third example so as to leave the bones in situ. The skeleton was lying about two feet below the surface. When the first few inches of loam were removed, charcoal and charred fragments were exposed, suggesting that a fire had been kindled over the dead. The section made by slicing away the earth on top of the bank, immediately above the skeleton and slightly obliquely from the surface is shown in plate iii, fig. 1; the dark imbedded pieces of charred wood may be seen in the photograph. A picture of the undisturbed thorax and limbs of the aborigine is reproduced on plate iii, fig. 2. As is stated to be usual with earth burials the corpse was interred in a doubled up position. The body was lying on the left side; the arms were flexed with the humeri lying on the ribs, and the legs were bent so that the knees almost reached the wrists. The skeleton was lying east and west, with the head to the west. From the attitude of the aborigine it would appear that a shallow, circular grave little more than a yard in diameter had been excavated and the body doubled up and placed therein. This skeleton proved to be that of a man.

A skeleton recently secured in a clay-hole at Croydon was doubled up in a sitting position, bending slightly forwards. In this case the lower part of the skeleton was buried in ashes and cinders, while a few *Unio* shells had been included in the soil used to fill the grave.

Explanation of Plates.

Plate ii.

Fig. 2.—Upper terrace of the Torrens valley; the figure is standing on the aboriginal burying ground.

Plate iii.

Fig. 1.—Section showing indications of a fire above grave.

Fig. 2.—Skeleton partly exposed to show position of limbs.

ABORIGINAL ROCK CARVINGS IN SOUTH
AUSTRALIA.

By Herbert M. Hale.

In 1902 E. G. Waterhouse (1) drew attention to some rock carvings at Mannahill, South Australia, which differed in technique from any previously discovered; they consist of patterns formed by a series of rather deep indentations. Twelve years later H. Basedow (2) described and illustrated similar carvings in seven different localities, and mentioned three other places in our State where they had been seen. In June of last year a further occurrence of this form of native art was recorded (3) and a map furnished indicating the South Australian localities (with the exception of Mallett) where the carvings occur. Two months later J. P. H. Biddle (4) and T. D. Campbell (5) described additional carvings from Burra.

The map mentioned shows that seven occurrences of carvings have been recorded in the Flinders Ranges between Lake Torrens and Lake Frome, the most southerly of this series being at Oratunga, north-east of Parachilna. Running south the next recorded carvings are at Carrieton, east of Port Augusta. Mr. G. T. Hunt now informs me that there are carvings at Wilpena 35 miles south of Oratunga and over 60 miles north of Carrieton. Mr. Hunt states that he observed the intaglios on upright rock-faces on the left bank of the Wilpena Creek, about five miles from the Wilpena station. The intaglios consist of only four or five circles, each about twelve inches in diameter; it is probable, however, that a search would reveal further carvings in the vicinity. The large circles are evidently similar to those examined on perpendicular rock-faces in the Gammon Creek (Hale and Tindale, p. 55).

Mr. C. P. Mountford has knowledge of some carvings at Black Rock, a few miles east of Orroroo and others have been reported from Wabricoola, about 20 miles north-west from Yunta. Mr. J. W. Hosking, in a paper following, describes carvings at Pekina Creek, Orroroo. Thus, seventeen South Australian localities at which these intaglios are found may now be listed, but some of the occurrences have not been described in detail.

References.

- (1) *Trans. Roy. Soc., S. Aust.* xxvi., 1902, p. 326.
- (2) Basedow, *Journ. Roy. Anthropol. Inst.*, xlv., 1914, pp. 195-211, pl. i—xvii.
- (3) Hale and Tindale, *Rec. S. Aust. Mus.*, iii., 1925, pp. 52-56, pl. iii. fig. 3-4 and pl. iv-v; and text figs. 21-22.
- (4) Biddle, *Trans. Roy. Soc. S. Aust.*, XLIX., 1925, p. 121-122, pl. X.
- (5) Campbell, *Trans. Roy. Soc. S. Aust.*, xlix., 1925, p. 123-127, pl. xi and xii.

NATIVE ROCK CARVINGS AT PEKINA CREEK, ORROROO, SOUTH AUSTRALIA.

By John W. Hosking.

Late in October, 1915, when returning from Moolooloo, I spent a few days at Orroroo. On enquiring of the oldest residents of that town whether native rock drawings or carvings had been noted in the district, I was assured none such existed.

The photographs reproduced on plate iv. are of carvings which I located during my short stay, on the sloping slate-like rock on the bank of the Pekina Creek, within half a mile of Orroroo.

Unfortunately no natives were in the vicinity so I was unable even to attempt to procure any information regarding the antiquity of the work.

The indentations are of a similar nature to those recorded at Oratunga, near Moolooloo Station, and, like the latter appear to have been cut into the rock-surface by chisel-like implements aided by some form of mallet. The carvings illustrated are not as variable in design as are those at Oratunga, however, they consist almost entirely of circular lines, while at Oratunga the group of circles is surmounted by undulatory lines, interspersed by double circles, one within the other. The engravings at Pekina Creek, as elsewhere, vary considerably in depth, some appearing of more recent origin, but whether this is really so, or whether the lighter ones have suffered to a greater extent through the exposure to climatic conditions, remains a problem. Appearances certainly indicate that the carvings were executed at different periods.

Explanation of Plate.

Plate iv.

Figs. 1 and 2. Two views of native rock carvings at Pekina Creek, Orroroo, South Australia.

LECTURE BY Mr. F. G. HOLDAWAY, B.Sc., ON
"AN AUSTRALIAN PLANT BUG— *Tectacoris lineola*."

In an extremely interesting lecture Mr. Holdaway explained that this insect had previously confined its ravages to the the hisbiscus or the bottle tree. But since the appearance of the cotton plant it has emerged from its obscurity and compelled the attention of the planter and of the scientific investigator. The insect belongs to a group of the *Hemiptera* (half-winged), known as shield bugs, closely related to the aphids and scale insects. It is not a beetle as might appear to those unfamiliar with insect structure. The form of the mouth is notably different. The beetles have hard, biting jaws, but *Tectacoris* has a long, piercing beak, and is capable of feeding only on plant juices. Both young and adults exhibit brilliant colours, and the colour pattern of the latter varies considerably. They are commonly orange red with golden green or blue markings, but specimens occur on which there is no blue or green, the colour being a uniform orange. Examination of a large number of these bugs shows that the bright colours are more common to the males, although some are quite as plain as the female. In *Tectacoris* the males are easily distinguished by the presence of a pair of brown marks on the under surface of the abdomen.

This bug sucks the juices of malvaceous plants, particularly various species of native hibiscus. It feeds mainly on the seed capsules, but occasionally on the young stems, and in northern Australia on certain of the bottle trees. It also feeds on the cotton plant, and appears to prefer this more succulent plant to the hibiscus. It was this fact, coupled with the discovery of fungus and bacterial disease in developing cotton bolls (the fruit of the cotton plant), that suggested investigation of the life and habits of this insect. These observations, too, are interesting from the point of view of pure science. The eggs are laid side by side around a leaf stalk for a length of about an inch. The average number of eggs in this mass is 100, and the process of laying takes two and a half hours. When it is completed the female seats herself on the egg mass, and remains there until the eggs are hatched, in about three weeks. The "maternal instinct" exhibited by these lowly forms is remarkable, and rare among insects. The tiny bugs emerging from the eggs crawl to the under surface of a leaf, and remain there in a cluster for a week, after which the first moult occurs. Neither nymphs nor adults feed during the night, but seek shelter until the sun has been up for some time. Full growth is not reached until from 70 to 80 days, and

they live as long again after reaching maturity. The bugs feed mainly on the unripe bolls by thrusting their beaks into the plant tissues.

Experiments designed to ascertain the effect of the bug attack showed that those flowers which had been attacked by *Tectacoris* had the cotton and the inside of the seeds stained brown, and those protected in small cages made of cane and voile were free from disease. The effect of the attacks by these organisms is seriously to lower the commercial value of the cotton products.

—————: o :—————

NEW MEMBERS ELECTED DURING 1926.

The following new members are heartily welcomed and it is hoped that each one will take up the study of some branch of natural history.

- Mr. H. C. Godfrey, Robert St., South Payneham.
- Mr. R. Cavanagh, Rhyl Av., Wayville.
- Mr. F. G. Holdaway, B.Sc., University, Adelaide.
- Miss E. Deland, University, Adelaide.
- Rev. A. Depledge Sykes, 82 Brougham Place, Nth, Adelaide.
- Mr. R. C. Catt, Newcastle St., Alberton.
- Dr. W. F. S. Webb, Percy St., West Croydon.
- Miss Dora Tyler, Clark St., Wayville.
- Mr. F. M. Bailey, Botanic Gardens, Adelaide.
- Mr. C. E. Cole, 5 Simpson St., Gilberton.
- Mr. W. T. Gilpin, Quarantine Stn., Pt. Adelaide.
- Mr. H. Williams, Medindie Gardens, Walkerville.
- Rev. H. A. Gunter, Payneham.
- Miss E. W. Deland, 34 Trevellyan St., Wayville.
- Mr. H. Woodlands, G.P.O., Adelaide.
- Mr. W. Sheridan, c/o Messrs. McPhersons Pty. Ltd., Waymouth Street, Adelaide.
- Mr. M. W. Burge, 23 Walkerville Ter., Gilberton.
- Miss M. E. Roberts, Alpha St., Kensington Park.
- Miss Fea, Jerningham St., North Adelaide.
- Miss E. M. G. Morphett, Sheffield St., Malvern.
- Mr. J. Norman, Public School, Thevenard.
- Mr., Mrs., and Miss Dodd, Myponga.
- Mr. E. Stansfield, Main St., York.
- Miss R. M. Sloper, 35 Uxbridge St., Kensington Park.
- Mr. J. E. Machell, Teachers College, Grote St., Adelaide.

EXCURSION TO Highbury, August 21, 1926.

A large party travelled by charabanc to the home of Mr. H. J. Coulls, near Highbury. To many members the trip was a revelation of the wonderful beauty of the valley of the Torrens above the City. Orange trees decorated with the golden fruit, orchard trees, vegetable and fruit gardens, and pine plantations composed the foreground while in the distance the foothills made a delightful background to the picture. Some of the earliest buildings in the State, including the remains of the oldest mill erected in the early days interested the party very greatly. The channel of water flowing from the Gorge to supply Hope Valley Reservoir was an interesting feature in the scene. Afternoon tea at the residence of Mr. Coulls, overlooking the beautiful plains of the Torrens Valley formed a fitting completion to the trip.

EXCURSION TO HORSNELL'S GULLY, SEPTEMBER 4, 1926.

A small party of members walked up the eastern arm of the gully and greatly admired the combination of steep rocky cliffs, flowing creeks and grassy flats. It was too early to secure many flowers in this sheltered spot, but the party enjoyed the rambles amidst Nature's charms.

EXCURSION TO HENLEY BEACH, SEPTEMBER 18, 1926.

A small party decided to visit the Beach in place of travelling to the Enfield Scrub. On the walk from Henley to Glenelg a great variety of shells, seaweeds, and other forms of shore life was secured and these made the subjects for descriptive talks.

EXCURSION TO GILLES PLAINS, SEPTEMBER 25, 1926.

Through the kind invitation of Messrs. Pitman Bros., a large party visited their property at Gilles Plains. Beautiful views were obtained across the Valley of the Torrens. The orchard of orange and lemon trees in full bearing interested the members as also did the up-to-date irrigation plant supplying the needs of many acres of growing vegetables. Refreshments were kindly supplied by the ladies of the household. Mr. W. J. Kimber acted as leader and with his intimate knowledge of the locality made an excellent guide.

VISIT TO THE BOTANIC GARDEN, OCTOBER 2, 1926.

A large party, under the skilful guidance of the Director (Mr. J. F. Bailey) were taken through the Garden. The growth of the native plants and trees was the principal subject of the leader's talk. The Director is experimenting very largely in the growth of native plants and the results are exceedingly encouraging.

EXCURSION TO LONG GULLY, OCTOBER 9, 1926.

Members travelled by train to Long Gully and climbed the ridge to the North of the station. The leader, Mr. Ising spoke on the species of Gums found growing here.

EXCURSION TO MYPONGA, OCTOBER 13, 1926.

On Eight Hours' Day Mr. Botting's charabanc took a very full load over Sellick's Hill to Myponga where, through the kindness of Mr. and Mrs. Page, we found perparations had been made for our entertainment at the District Hall. After lunch the party went to Beautiful Valley and collected flowers for the Show on the following Friday. A large variety of flowers was obtained and the "general display" tables at the Show were fully furnished.

EXCURSION TO CHARLESTON, OCTOBER 30, 1926.

A large party journeyed up the Gorge Road and through Tweedvale to Charleston. The party were kindly received by Mr. and Mrs. Simpson at their fine property. Members were greatly interested in what they saw of the fine live-stock, the horses, sheep and pigs, not forgetting the extremely intelligent sheep dogs who rounded up the flocks for the inspection of the visitors. Some members climbed the slopes of Mount Charleston and studied the trees and flowers that still flourish on the higher slopes.

EXCURSION TO MOUNT BOLD ROAD, NOVEMBER 13, 1926.

The charabanc trip to Mount Lofty and along the Mount Bold Road is certainly one of the most picturesque in the Mt. Lofty Ranges. The road runs along a ridge, on each side of which may be seen a panorama of hills and valleys with range behind range to the far blue horizon. To the east the River Onkaparinga flows through a deep gorge on its way to the weir at Clarendon.

The sandy soil, with its scrubby vegetation is full of interest to the student. The district is noted for its beautiful blue Thelymitras (Sun Orchids). This year very few were seen, though usually they are plentiful at this time of the year. In Victoria, too, it has been found that orchids do not flourish every year.

The white *Pimelea octophylla* (The Downy Rice flower), the creamy *Calythrix tetragona* (Common Fringe-myrtle), the beautiful blue *Dampiera rosmarinifolia* (the Rosemary Dampiera), the quaint Trigger flowers (*Stylidium*) and the little blue *Lobelia* were the most abundant flowers taken.

A few orchids were seen, the most interesting being one fine specimen of the rare Orchid, *Thelymitra fusco-lutea* (the Blotched Sun-orchid), Others were *Caladenia dilatata* (the Spider-orchid), and *C. Menziesii* (the Hare-orchid). On the sandy rises the Cabbage-gum (*Eucalyptus cosmophylla*) flourished, its large fruits being a very conspicuous feature.

EVENING LECTURE BY Mr. W. J. KIMBER ON "THE CEPHALOPODA."

The lecturer spoke first on the many extinct species now represented by fossils. He then dealt with the many existing representatives of the order, such as the octopus, the pearly nautilus, the paper nautilus and the squid. The wonderful adaptations of their organizations and their life histories were lucidly dealt with.

EVENING LECTURE.—DR. BASEDOW ON "PRIMITIVE AUSTRALIA", OCTOBER 19, 1926.

Dr. Basedow spoke on the aboriginal people of Australia. After showing a number of excellent lantern views the lecturer described items of interest connected with the expeditions he had led or accompanied in Central and tropical Australia. He referred to the wellknown "message sticks" of the aborigines, and explained that there was a great series of these objects in use among nearly all the tribes of the mainland. Some were mere sticks, which were given to special carriers to serve as "memory ticklers." Certain carvings on these sticks represented definite persons, objects, stages, and times, which had gradually been conventionalised, so that every native understood their meaning. The most interesting tokens of this description were the sacred sticks and stones known as "Tjuringas," which were principally used as notices of pending initiation ceremonies. Upon these objects there had been traced interesting marks, which were the equivalent of thought symbols, and might be regarded as similar to the hieroglyphics of the ancient Egyptians. The subject, unfortunately, had not received the investigation it merited. The lecture was most interesting and informative.

Members are reminded that subscriptions for the present year are due and may be paid either to Mr. B. B. Beck at Cole's Book Arcade, Rundle St., or forwarded to the Treasurer, Mr. F. Trigg, Government Printing Office, King William Road.

S.A. SHELL COLLECTORS' CLUB.

Among other shells studied during the last quarter were:—

FAMILY CYMATHIDAE.

Cymatium Waterhousei, Adams and Angas. This shell is frequently found along our Southern and Western Beaches, secreting itself in rock holes close inshore. It has the usual *Triton* characteristics, viz., prominent varices, knobs, thick outer lip, which is scalloped within, short canal. The living specimen carries a thick brown periostracum. Certain differences separate it from the larger shell, *C. spengleri*, making it somewhat difficult to identify.

C. spengleri, Perry. This shell is rarely found on our beaches. Two broken examples, $4\frac{1}{2}$ inches in length, were recently discovered on the Goolwa beach. Some fine specimens of this species, $6\frac{1}{2}$ inches long, from New South Wales, were exhibited.

Eugyria subdistorta, Lamarck. Collected at Middleton. A very beautiful shell, carrying regular rows of small round knobs, the depressions between being of a rich, dark-brown color.

Personella verrucosa, Reeve. Very common variety in South Australia, apparently synonymous with the species formerly known as *Quoyi*. A dark periostracum completely covers the live shell, which is sealed with a horny operculum.

C. exaratum, Reeve. A rare specimen, collected on the South Coast. Shell cream color, shaded pink, strong knobs, and deeply sutured.

FAMILY CASSIDIDAE.

Phalium fimbriatum, Quoy. A large, heavy shell, with wide columella and recurved canal. The revolving ridges on the body whorl carry strong knobs. Common in certain places in St. Vincent's Gulf, notably Sellick's Beach. This species is fond of the shallow, sandy patches, and may be noticed half buried as the tide recedes. Many of these shells have their beauty entirely spoilt by frequent exposure to the sun at such times.

Phalium semigranosum, Lamarck. Shell common in South Australia. The spire is closely covered with revolving rows of small knobs, which run off into the smooth shining white body whorl. A young specimen, with its thin, unfinished outer lip, exhibits a beautiful translucent pink appearance. The outer lip recurves as maturity is reached.

P. pyrum, Lamarck. Occasional specimens are collected on our Southern beaches. Seven or eight dark brown color splashes ornament the flattened outer lip. An immature shell exhibited had two distinct varices, each with the row of brown spots.

FAMILY NATICIDAE.

Polinices conica, Lamarck. Found on most sandy shores, ploughing along just under the surface of the wet sand. The remarkable sand-girdle, in which are encased the egg capsules, is often found cast up. This wonderful structure, formed of glutinous matter, coated with sand, is moulded over the shell, and is an object of extreme interest. *Polinices* are carnivorous molluscs, and take heavy toll of bivalve shells, through which they drill small holes, sufficient to get at the soft parts.

P. incei, Philippi. A bluish-grey colored shell with depressed spire. Very common at Middleton, but not easily taken alive, as it apparently lives beyond the surf line.

Sinum zonale, Quoy and Gaimard. Formerly known as *Sigaretus*. Frequently found when the tide recedes on sandy beaches. Its enormously developed foot, almost completely conceals the small ear-shaped shell.

Nov., 1926.

F. TRIGG, Hon. Sec. Shell Club.

THE S.A. AQUARIUM SOCIETY.

The annual meeting of the Aquarium Society was held on November 20th., at Mr. B. B. Beck's residence, Fullarton; the ninth year of the activities of the Society was completed on this date. The annual report, as read by the Hon. Secretary (Mr. H. M. Hale) showed that five general meetings and three excursions were held during the session. When camping at Finnis Creek members discovered the male plant of the water-weed *Vallisneria*. This was an exceptionally interesting observation because it was previously supposed that only female plants occurred in Australia. At the Field Naturalists' Wild Flower Show, in October, members staged an exhibit consisting of 18 aquaria containing fishes and other animals; this installation proved a considerable attraction.

For seven months of the session the President (Mr. Edgar R. Waite) was absent in Europe and America, and there visited the principal Aquaria; next year he will deliver a lecture dealing with his observations.

The following officers were elected for the ensuing year:—President, Mr. Edgar R. Waite; Vice-presidents, Messrs. J. W. Goodale and T. Nettelbeck; Committee, Miss Roeger and Messrs. B. B. Beck, C. F. Blewett, F. K. Boase, R. Carpenter and J. W. Hosking; Auditor, Mr. A. E. Wadey; Hon. Secretary and Treasurer, Mr. Herbert M. Hale.

The South Australian Naturalist

The Journal of the Field Naturalists' Section of the Royal Society of South Australia.

Adelaide

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Feb., 1927

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Hon. Auditors—Messrs W. D. Reed, F.C.P.A., and A. J. Morison.

"The South Australian Naturalist"—Hon. Editor, Mr. Wm. Ham, F.R.E.S.
Address: University, Adelaide.

LECTURES.

March 15—Miss E. D. Macklin, B.Sc., "Seaweeds". With lantern slides in the Royal Society's Room. Exhibits.

April 19—West Australian Evening by visitors to the meetings of the Australasian Association for the Advancement of Science, Perth, 1926—Mr. W. Champion Hackett, Prof. J. B. Cleland, Messrs. J. F. Bailey, and E. H. Ising. To be given in the Royal Society's Room.

May 17—Mr. G. F. Hussey, "A trip around the World." Lantern and episcopes views in the Lecture Room.

EXCURSIONS.

March 5—Outer Harbor. Train 1.35 p.m. Dredging in Gulf. Prof. T. Harvey Johnston and Mr. B. Beck.

March 19—Halletts Cove. Train 1.37 p.m. Glacial Features, etc. Dr. C. Fenner, F.G.S.

April 2—Eden. Train, 2.3 p.m. Evidences of a Past Ice Age. Prof. W. Howchin, F.G.S.

April 25 (Anzac Day)—Aldinga Bay. Charabanc, 9 a.m. Shells and Fossils, etc. Mr. W. J. Kimber.

May 7—Morialta. Tram, 2 p.m. Physiography. Mr. W. Ham.

May 21—Fullarton (Dr. A. W. Hill's). Tram 2.30 p.m. "A Trip to the South Seas." Mr. W. Champion Hackett.

The South Australian Naturalist

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FEBRUARY, 1927.

No. 2

FIELD NATURALISTS' TRIP THROUGH WESTERN VICTORIA.

By W. Ham and E. H. Ising.

Three members of this Section were recently fortunate enough to be able to spend time in travelling somewhat off the beaten tracks through South-western Victoria.

The trip was made possible through the kind invitation of Mr. R. G. Shorthose to accompany him in his motor caravan.

We crossed the Murray by the punt at Wellington and after dinner at Meningie situated on the shores of Lake Albert we ventured along the tracks of the Coorong. These are for the most part unmade and in many places subject to sand drifts after storms. However we made good progress, our track leading along close to the long sheet of water, (lagoon) known as the Coorong. This is about 90 miles in length and is shut off from the Southern Ocean by a huge sand spit. Though such a very long sheet of water the depth varies very greatly, a great part being so exceedingly shallow, that there would seem to be little chance of it ever becoming of use for navigation.

Our first night was spent at the shore end of the Kingston jetty, reputed to be a mile in length. A visit to Robe with its old buildings, its lakes, its picturesque coast line and wave-cut rocks made us all regret we could not prolong our visit.

Our course to Mt. Gambier led us past many lakes mainly salt and many dry. Passing the pretty town of Millicent we saw in the distance the great (planted) forest of pines at Mt. Burr and neighbouring places. Nearing the Mount we were interested in the limestone quarries whence the stone is sawn out in big blocks (cuboids). Later we were to see the stone being sawn into blocks and used in the Melbourne suburbs. Mount Gambier seemed even more beautiful and more wonderful than we had remembered it. We were able not only to admire the lakes but to secure specimens of the ash and lava as well as many stone chippings, scrapers, etc. made by the aborigines in their time. Needless to say we admired that glorious Town Hall Garden which shows what perfect garden soil the wind-blown ash from the volcano has made. Later, we were to see similar volcanic soils around some of the craters of Western Victoria

Leaving the fine roads of our south east we travelled along the "Prince's Highway" into Victoria, and hard going we found it. However, the construction gangs were at work and next year should see a good track practically all the way to Melbourne. Our camp the next night was at the famous old town of Portland, an Australian museum of antiquities. Here the Hentys made the first settlement and here that fine explorer, Major Mitchell, met them, with great suspicion on both sides, if we may trust local stories. A private museum here contains much of great interest to all visiting naturalists, the little garden of medical and other herbs being of special interest to botanical members. But we had to drag ourselves away and the afternoon saw us bowling along over good roads to Koroit to see the famous Tower Hill, the largest of the many ancient volcanoes of Victoria and generally regarded as the last one to sputter out its volcanic dust and lapilli. The road leads over a shoulder of the hill, and here leaving the car and walking a few yards, the observer finds himself on the brink of an immense crater, several miles in circumference. At his feet, hundreds of feet below, the bottom of the crater consists partly of rich cultivated soil and partly of a very large lake while in the centre there rise the smaller though still impressive cones which were built up by the volcano in its final outburst. As we motored along we were able to appreciate the wonderful fertility of the soil, formed from the ash thrown out by the volcano and carried by the wind in all directions. No detailed study of this wonderful mountain has yet been made and it has not been scientifically determined how far the ash extends, as has been so skilfully worked out for Mount Gambier by Dr. C. Fenner of our own Section. The horticulturist finds the soil admirably suited for the production of potatoes and onions. From the latter crop we heard of returns up to £90 per acre!

Our course now lay across the great lava plains dotted with the numerous rises marking the many volcanic outlets of the lava which solidified into the characteristic basalt of to-day.

We admired the town of Warrnambool with its white stone, and its Cupressus Lambertiana trees, as well as its enormously solid breakwater. Then on the road again over the volcanic plains, past the many great and small lakes, never out of sight of volcanic hills, some of which have craters and crater-lakes. Here, too, the surrounding country is wonderfully enriched by the volcanic dust from the volcano. The more vesicular lava has broken down into a deep rich soil. Not that all lava makes soil. Indeed in many places the lava streams still run across rich soil. In many parts it is more solid and resists the action of the elements and is broken down only so far as to form a thin the country standing up like huge rough walls.

The next morning saw us at Geelong, which has given over its old air of "sleepy-hollow" and is rapidly becoming a centre of active industrial life. Great factories form a fitting introduction on the south side and the busy streets give one the impression of solid prosperity. The characteristic buildings of Ford's Works on the outskirts are rapidly becoming the nucleus of a new industrial centre and other great industries are being established here. The architecture is of a high order. In particular the memorial building, though not large is one of the finest in Australia. From Geelong to Melbourne, the road is being reconstructed, and will be one of the best in the world.

W.H.

A detailed description of the vegetation seen on our route cannot be given as time did not permit making notes or collecting specimens except in isolated instances.

The Coorong is not a waste of sand and lagoons but is densely clothed with native plants. The usual sand-dune type of plants is present with the addition of a large mixture of mallee which forms the vegetation of the hinterland. The larger mallee types are composed of species of *Eucalyptus*, *Melaleuca*, *Casuarina* and *Acacia*. So dense is the growth in places that bush fires are possible, for one was observed on our return besides evidences of others in the past. For the whole of the 90 miles of the Coorong the vegetation is of a similar nature in that the dominant plants have hard leathery leaves suggesting dry conditions for growth. The rainfall, however is good, being 18 inches annual average at Meningie at the northern end of the Coorong and 24 inches at Kingston at the southern end. The dry conditions are caused, however by the soil type which is of limestone subsoil formation overlain by sandy loam.

After leaving the Mount Lofty Range at Meningie there is practically no high land throughout our south east. The exception is around Mount Gambier and possibly near Robe. The vegetation varies slightly between Kingston and Robe where on flatter country some large gums make their appearance. Turning easterly the plant growth distinctly changes.

From near Millicent towards Mount Burr and the hills near, the stringybark (*Eucalyptus obliqua*) and bracken fern (*Pteridium aquilinum*) make their appearance. Travelling eastwards and into Victoria this class of country predominates.

On the route that we took only the western portion was clothed with vegetation. From the border through Dartmoor, Portland and Warrnambool the gum forest prevailed. The smooth-barked Eucalypts were prominent although the rough-barked species were plentiful as well. It was very pleasing to see small forest plots planted along the fences and in other groups.

These plantations occurred in the Warrnambool—Camperdown districts. There appeared to be no native trees (or very few) in these districts and in fact they were conspicuous by their absence going through Colac, Winchelsea, Geelong to Melbourne.

The tea tree scrub lining the north and eastern shores of Pt. Phillip Bay is a wonderful heritage and it is a great credit to the Melbourne people that so much of it has been left intact. Nearer the city it has been cleared a good deal, but from Frankston to the Heads it is still in an almost unbroken belt. At Mornington, where we stayed for several days, we had an opportunity of inspecting it. The dominating plant is the coast tea tree (*Leptospermum laevigatum*) which grows to a height of 20 feet with fluted trunks up to 6 inches diameter. Other typical coastal plants were growing such as *Rhagodia*, *Alyxia buxifolia*, *Logania*, *Banksia integrifolia* (Coast Banksia), *Mesembryanthemum* (pig face).

On our return practically no vegetation was observed until near Ballarat. Mounts Warrenheip and Bunniyong were clothed with trees growing in a dense stand. Further on passing through Arrarat, on the way to Stawell, fine open forest country was met with and extended for about 20 miles or more to the Grampian Mountains. This forest was of various species of gums with little undergrowth.

E.H.I.

(To be continued.)

SHELL COLLECTORS' CLUB.

By F. Trigg, Hon. Secretary.

Among others, the following shells were studied during the quarter:—

Family CYPRAEIDAE.

Cypraea angustata, Gmelin. These Cowries may be gathered at times from all our beaches. A humble representative of an aristocratic molluscan family, this strange little orange colored shell appears to be the desiderata of most shell lovers in South Australia, being sought for eagerly to the exclusion of all others. In life the cowries favor the undersides of stones and protected rock holes in shallow water. Turning over a stone a red splash of color denotes its presence. The scarlet double mantle meeting over the back of the shell, deposits in layers the material which eventually conceals the spire, thickens and channels the long aperture, and is responsible for the glorious color patterns associated generally with Cowries.

The type shell *C. angustata* is the largest variety of this species, averaging at maturity about $1\frac{1}{4}$ inches in length, dark orange color, without bands.

Variety *Comptoni*, Gray. Smaller than the preceding, lighter in color, but with generally three broken color bands of brown on dorsum. Collected at Pt. Willunga.

Variety *piperita*, Gaskoin. Brown with many small spots on dorsum.

Variety *albata*, Verco. A rare specimen, white, without spots or bands.

C. Reevei, Gray. This cowry, from Yorke Peninsula beaches, is an inflated orange colored shell, pink tips, with faint brown bands traversing the dorsum. It is noticed that the extremity of the spire is usually just visible, remaining uncovered by the overlaying process.

C. Friendi, var. *thersites*, Gaskoin. This comparatively rare specimen inhabits both St. Vincent and Spencer's Gulf, in favored localities. It sometimes attains the length of $2\frac{1}{2}$ inches, and is a fine, handsome cowrie, much desired by all collectors. The base is flattened, white, running into a black margin, the upper portion of the shell being plentifully covered with dark brown and orange blotches. An exceedingly interesting series of *C. thersites* was recently exhibited in the S.A. Museum, showing development from infancy to maturity. A large dead specimen was recently collected at Pelican Point, at the entrance to the Port Adelaide River.

Family OLIVIDAE.

Oliva australis, Duclos. A fairly common shell in S.A. Our representative of this large and beautifully decorated world-wide family attains about $1\frac{1}{4}$ inches in length, and is predominately glossy white. The young *Olives* are very beautiful, being covered with numerous reddish-brown spots. The cylindrical shell terminates in a sharply-pointed spire of five whorls. The *Olives* are collected on sandy patches at low water.

Family CANCELLARIIDAE.

These molluscs belong to one of the small shell families, and are vegetarian feeders. The columella has several plaits or plications. No operculum. About half a dozen species inhabit South Australia, two of the common varieties being:—

Cancellaria laevigata, var. *undulata*, Sowerby. Several specimens were recently collected at Middleton, measuring 2 inches in length, of a dark cream color.

C. spirata, Lamarck. A smaller shell, deeply sutured with light brown blotches on the cream-colored body whorl, Common at Middleton.

Family FASCIOLARIIDAE.

Taken from the weedy patches close in shore on most of our beaches.

Fasciolaria australasia, Perry. This shell is subject to great variation in form. Collecting several in company some are quite smooth whorled, and others distinctly coronated (var. *coronata*). A whole series may be collected running one into the other. Several obscure plaits ascend the columella. A horn-colored operculum.

Some foreign *Fasciolaria* attain large dimensions, and are superbly decorated. A specimen from Florida, *F. tulipa*, shown was 8 inches in length. Our uniformly brown shell is usually about $3\frac{1}{4}$ inches long.

Verconella maxima, Tryon (formerly known as *Siphonalia*). This is a large, solid shell, found along the Coorong beach. One aged dead specimen recently collected measured $5\frac{1}{2}$ inches and weighed over $\frac{1}{2}$ a pound.

V. ustulata, Reeve. A prettily sculptured light brown shell, rather rare. Habitat: Middleton.

Fusinus Nova-Hollandiae, Reeve. A common South Australian shell. Its long canal occupies nearly half its length. Many perfect examples may be collected almost at any time on our Gulf beaches.

THE WEST AUSTRALIA RED-FLOWERING GUM.

BY J. F. BAILEY, Director Botanic Gardens, Adelaide.

Early in January the public gardens and parks of Adelaide were made gay with the flowering of the varieties of the West Australian Red-Flowering Gum, than which there are few more beautiful subjects in the vegetable kingdom.

This gorgeous species is endemic to the western State and strange to say is confined to a very limited area. About this, J. H. Maiden in his fine work on the Eucalypts, gives some interesting information obtained from Mr. E. J. T. Brockman, of Reilly, W.A. through the good offices of Dr. R. H. Pulleine, one of our members. According to this authority the species is only found in its wild state along the South coast in small areas extending from Denmark to the Nornalup Inlet, a distance of about 35 miles by roughly 5 miles.

Although in its native haunts no variation in the color of the flowers has been observed, when grown from seed obtained



Block kindly lent by the Director of the Botanic Garden.

RED FLOWERING GUM

(Eucalyptus ficifolia)

Tree growing in Botanic Garden, Adelaide.

from cultivated trees, quite a variety of shades is obtained, so that no reliance can be placed in getting plants true to the parent by this mode of propagation. A white variety has been produced of which a good specimen is growing near to the Domain entrance to the Melbourne Botanic Gardens. A theory has been advanced that these variations are brought about by cross fertilisation with the "Marri", *E. calophylla*, a closely allied species from the same State which has also produced colored varieties under cultivation. In the Adelaide Botanic Garden are trees of *E. ficifolia* with scarlet, crimson, and orange-scarlet flowers respectively, and these presented a brilliant sight till the heat wave which started on the 8th of last month (January) suddenly put an end to the show. Few Eucalypts have proved suitable for street subjects, but the dwarf habit and hardiness of the species in question seem ideal for the purpose and of late years advantage has been taken, here and in the other States, to plant it extensively. The species has been grown for many years under glass in Europe, but the first record of its success in the open in England is to be found in the Gardeners' Chronicle for 30th November, 1907, where it states that good flowering specimens were produced in the garden at Cove House, Tiverton, Devonshire, during August of that year.

The seed takes a considerable time in coming to maturity, the capsules resulting from the previous year's flowering usually being ready for gathering about the time of the next blooming period. These if placed in the sun will open in a day or two and shed their seeds.

The plants are easily raised from seed and the following method is recommended. Sow 3 or 4 seeds, one inch apart in a 4 inch pot during the Spring or Summer, on top of soil composed of equal parts of loam, leaf mould, and sand, and slightly cover with finely sifted soil. The soil should be moistened before being placed in the pot, and from the very first on no account should the watering be neglected. When seedlings have attained a growth of about an inch they should be reduced to one in each pot, selecting naturally the strongest to remain. In twelve months or less under ordinary conditions good strong plants of one or more feet high should be available for planting out in their permanent situations. Good results cannot be expected from plants that have been allowed to have become pot-bound.

In November 1923 when carrying out alterations near to the North Terrace entrance to the Botanic Garden, a one year old plant, about one foot in height, was used as a centre piece for the circular lawn, and has attained a height of eleven feet with a corresponding spread and produced a few flowers last month (January, 1927).

ADDITIONS TO THE FLORA OF MINNIE DOWNS.

By J. B. Cleland, J. M. Black and L. Reese.

A list of plants occurring in the north-east corner of South Australia has been published by us (1) and since then further specimens have been received from Mr. L. Reese, Minnie Downs. Out of 62 species forwarded 22 were not recorded before.

The first list recorded 253 species and the present one adds 22 making a total of 275 for the north-east corner of our State.

Notes on the specimens (by L.R.) are given and they refer chiefly to the fodder value of the plants.

The rainfall in this district is 5 inches average per year. At Minnie Downs the following rainfall was recorded:—1925, July, 18 points; September, 12 points; November, 80 points; 1926, March, 455 points; April, 205 points; May, 67 points; June 1 to September 13, nil. It will be noticed that the rain fell mainly in the summer.

GRAMINAE.—*Triraphis mollis*, R.Br. "Good fodder." No. 56.

Diplachne fusca, (L.) Beauv., var. *Muelleri*, J.M.B. New for so far north. "Good feed." No. 29.

CYPERACEAE.—*Scirpus cernuus*, Vahl. "Good feed." No. 27.

LILIACEAE.—*Bulbine semibarbata*, (R.Br.) Haw. "Good feed. I think this is the plant when eaten by cows taints the milk and butter and sometimes even the beef. Blacks bake the root for food." No. 28.

POLYGONACEAE.—*Rumex crystallinus*, Lange. "No good though eaten." No. 46.

CHENOPODIACEAE.—*Babbagia acroptera*, F.v.M. et Tate. New for so far north. "Not much growing." No. 40.

AMARANTACEAE.—*Alternanthera nodiflora*, R.Br. "When a bad time comes stock eat it. Frogs eat the seeds." No. 41.

PORTULACACEAE.—*Portulaca intraterranea*, J. M. Black. "Sandhill pig weed. Cattle, sheep and camels fond of it. The root is cooked in ashes and eaten by the blacks." No. 5.

CRUCIFERAE.—*Blennodia cardaminoides*, F.v.M.

Lepidium rotundum, D.C. "Cress; good stock feed. When young often eaten by stockmen." No. 17.

LEGUMINOSAE.—*Crotalaria Mitchellii*, Benth. "Growing in sand, 8 inches high, flowering August; eaten by stock." No. 10.

(1) Trans. Roy. Soc. S.A. Vol. XLIX., 1925, 103.

Trigonella suavisissima, Lindl. "One of the best herbages in the district." No. 33.

Swainsona phacoides, Benth. "Horses are particularly fond of it. Previous to 1926 it was not very plentiful but now it is growing everywhere. For every bush I saw prior to 1926 there are now a thousand growing. I hope next season it is just as plentiful as it is such a splendid stock feed. If the leaves and flowers are chewed they are just like green peas." No. 15.

S. phacoides, Benth. var. *argyrophylla*, J. M. Black.

ZYGOPHYLLACEAE—*Tribulus occidentalis*, R.Br. "Eaten by stock." No. 54.

Zygophyllum Howittii, F.v.M. "Eaten by stock." No. 52.

THYMELAEACEAE—*Pimelea trichostachya*, Lindl. "Eaten by stock." No. 2.

UMBELLIFERAE.—*Daucus glochidiatus*, (Lab.) Fisch. M. et A.L. "One of the best herbages in the district." No 32.

GENTIANACEAE.—*Erythraea australis*, R.Br. "Good feed for stock." No. 25.

PLANTAGINACEAE.—*Plantago varia*, R.Br. "Eaten by stock" No. 16.

GOODENIACEAE.—*Scaevola humilis*, R.Br. "Good feed for stock." No. 23.

COMPOSITAE.—*Gnephosis eriocarpa*, Benth. "Good stock feed." No. 14.

RULES OF THE FIELD NATURALISTS' SECTION OF THE ROYAL SOCIETY OF SOUTH AUSTRALIA.

1. The general management of this Section shall be controlled by a Chairman, two Vice-Chairmen, a Secretary, Assistant Secretary, a Treasurer, Librarian, Chairman and Secretary of the Flora and Fauna Protection Committee (ex officio), and a Committee of eight, five to form a quorum.

2. The Chairman, Vice-Chairmen, and Committee shall be elected at the annual meeting in August.

3. The Chairman shall not be eligible for office for more than two consecutive years, and the retiring Chairman shall be elected to a seat on the General Committee, and one of the Vice-Chairmen shall retire each year.

4. Candidates for admission not being members of the Royal Society, must be proposed and seconded by two members of the Section at one meeting, and be balloted for at the next ensuing meeting; one black ball in five to exclude.

5. Evening meetings shall be held on Tuesdays, at the discretion of the Committee of Management, for the purpose of reading papers, dealing with the natural history of Australia (more particularly of the neighborhood of Adelaide), and for the purpose of mutual instruction.

6. The evening meetings of the Section shall commence at 8 o'clock, and papers shall be taken not later than half-past eight. Any preliminary business or exhibits not disposed of at that time to be postponed till after the consideration of the papers.

7. There shall be at least eight Field Meetings during the year; the time and place to be arranged by the Committee

8. The financial year of the Section shall commence on 1st September, and the subscriptions shall be 7s. 6d. per annum for ordinary members and 3s. 9d. per annum for Fellows and Associates of the Royal Society, including issues of "The South Australian Naturalist."

9. At the annual general meeting a statement of accounts shall be submitted by the Secretary and duly certified by two auditors appointed at the previous ordinary meeting, preparatory to being handed to the Treasurer of the Royal Society.

10. The Section may from time to time elect as honorary members those who have been proposed and seconded in the usual way and have been unanimously elected by ballot. This shall also apply to corresponding members.

11. Any member owing the subscription to the Section, and neglecting to pay the same on or before the 1st day of January, shall be liable to have his name removed from the list of members of the Section; provided always that written application for the same shall first have been made by or on behalf of the Treasurer of the Royal Society; and, provided also, that the Committee shall have power to restore the defaulter's name at his request after payment of arrears.

12. The rules and regulations of the Section shall not be altered unless a written notice of motion, signed by no less than five members, be given at a meeting of the Section, and thereupon such motion may be brought forward at the next meeting.

13. Any resolution passed under Rule 12, altering or repealing the rules of the Section, shall be in force until the meeting held in the month of August following; and if not then confirmed shall thereafter be held void and of no effect.

14. On the written requisition of twenty members delivered to the Secretary, an extraordinary general meeting may be called to consider and decide upon the subject mentioned in the requisition.

15. The Committee shall be empowered to frame rules for the conduct of excursions arranged by them.

OUR EXCHANGES.

The Australian Museum Magazine.

The Victorian Naturalist for September and October.

The September number contains a well executed plate showing some Victorian orchids.

"The Australian Museum Magazine." No. 12.

"The S.A. Ornithologist." July number.

"Year Book of the Academy of Natural Sciences of Philadelphia." 1926.

"The Australian Forestry Journal." Twelve monthly numbers for 1926. This most interesting publication, edited by Mr. C. J. B. Watson, is issued monthly by the Forestry Commission of New South Wales. The articles in the various numbers include botanical, silvicultural and general forestry notes from every part of the Continent.

The Annual Report of the S.A. Woods and Forests Department for the year 1925-26. The area planted each year shows a satisfactory progress, rising to 3000 acres in all during the year 1925.

"The Australian Museum Magazine." January-March, 1927. An article on Sharks will be read with interest. "The Story of the Nototheria" includes all that it is at present known of this long-extinct animal which was possibly allied to our own diprotodons.

Smithsonian Reports.

(a) "Orchid Collecting in Central America."

(b) "A Botanical Trip to Ecuador, Peru, and Bolivia."

The Queensland Naturalist. December number.

The South Australian Ornithologist. January number. Mr. Sutton has a fine article on "A Week in the Robe District."

"The Victorian Naturalist." December and January numbers. Mr. Pescott continues his articles on the Orchids of Victoria. An article on the "Grasses of the Melbourne district" by Mr. P. F. Morris should be of great use to any member wishing to obtain some knowledge of the classification of our native and introduced grasses.. The illustrations are particularly helpful. Mr. J. W. Audas describes The King's Park, Perth, from the Botanist's point of view.

The Report of the Board of Governors of the Botanic Garden of Adelaide, 1925-6. Among the many interesting items may be noted a table giving the heights and girths of some of the taller trees in the Garden and a list of the birds noticed in the Garden and Botanic Park.

The Transactions and Proceedings of the Royal Society of S.A. (Vol. L.). The new volume is even more bulky than the preceding and the papers cover a wide range of subjects. Geology is well represented. Prof. Howchin publishes papers on the "Geology of the Barossa Ranges" and on the "Geology of Victor Harbor and the Inman Valley." These papers are well illustrated by map, pictures and diagrams. Professor Sir Douglas Mawson and Mr. Madigan also contribute interesting papers on geological subjects. Members of this Section are well represented. Prof. F. Wood Jones, Messrs. Lea, Holdaway, Tindale, Dr. Pulleine, Dr. Campbell, Mr. Hale, Prof. T. Harvey Johnston, Mr. Ashby, Mr. Samuel, Mr. Baker, Mr. Black and Mr. Hossfeld all contribute papers in their respective divisions of science. Branches of anthropology, zoology and entomology are all dealt with in these contributions. Members will find the volume of great value.

ADDITIONS TO OUR LIBRARY.

1. "Familiar Wild Flowers." F. Edward Hulme, F.L.S. F.S.A. The flowers, illustrated by fine coloured plates, are those common in England but many of these are common objects of our own waysides.

2. "A Naturalist's Pilgrimage". Richard Kearton, F.Z.S. A delightful autobiographical account of the life and struggles of this well known writer and lecturer on natural history subjects.

3. "Sea Creatures." I. N. Gayford. Charmingly written and profusely illustrated this book makes a fine introduction to the study of the life of the sea-shore.

4. "One of Nature's Wonderlands, The Victorian Grampians," by James Wales Audas, F.L.S., F.R.M.S. The author, Mr. Audas, a leading Victorian botanist, has made extensive expeditions through this fascinating region of Victoria, and has given us in this volume, a most instructive and interesting account of the scenery and vegetation of the region. The beautiful illustrations add to the attractiveness of the book while a very full index renders it easy to refer to the many plants described.

5. "Rocks and Fossils and How to Identify Them." By J. H. Crabtree.

6. "Fresh-water Fishes and How to Identify them." By J. Johnson, M.A., D.Sc.

7. "Fresh-water Wonders and How to Identify them." By J. H. Crabtree.

These volumes of this little series of books are simply written and well illustrated.

8. "The Australian Aboriginal." By Herbert Basedow, M.A. This comprehensive book contains a most interesting account of our aboriginal tribes. It is splendidly illustrated. Dr. Basedow has had unique opportunities for the study of our dark brother and this volume contains the substance of many years study of the aboriginal in his native surroundings.

The South Australian Naturalist

The Journal of the Field Naturalists' Section of the Royal Society of South Australia.



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The authors of papers are responsible for the facts recorded and opinions expressed.

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B. B. Beck, J. Neil McGilp, J. Sutton, A. H. Elston, Captain S. A. White,
and Mr. H. M. Hale. Dr. C. Fenner and Mr. L. Machell.
Hon. Auditors—Messrs W. D. Reed, F.C.P.A., and A. J. Morison.
“The South Australian Naturalist”—Hon. Editor, Mr. Wm. Ham, F.R.E.S.
Address: University, Adelaide.

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LECTURES.

June 21—Mr. G. F. Hussey—“Across Two Continents”
July 19—Mr. Edgar R. Waite, F.L.S., “A Trip to the Old World”
Aug. 16—Various Members—“Trip to West Australia with the Science Con-
gress”
Aug. 20—Exhibits and Annual Meeting.

EXCURSIONS.

June 6—Williamstown, Charabanc, 9 a.m., Town Hall. Geology and Native
Currants. Dr. C. Fenner and Prof. J. B. Cleland
18—Museum, Entrance, 2.30 p.m. General. Mr. Edgar R. Waite
July 2—Athenstone, Paradise Tram, 2 p.m. Botany. Mr. E. H. Ising
9—Henley South, Tram, Currie Street, 2 p.m. Shells. Shell Club.
16—Eden to Sleeps Hill, Train, 2.3 p.m. Foothill Gums. Mr. E. A.
S. Thomas.
30—Black Hill, Tram, 2 p.m. Fungi, etc. Prof. J. B. Cleland,
Aug. 6—Grange (North), Train, 2.30 p.m. Shore Life. Shell Club.
13—Enfield, Tram, Currie Street, 2 p.m. Native Scrub. Mr. E. H. Ising
20—Waterfall Gully, Burnside Tram, 2 p.m. Native Flora. Mr. J. A.
Hogan
27—Clarendon, Charabanc, 1.30 p.m., Town Hall. Orchids. Mr. W.
C. Hackett.

The South Australian Naturalist.

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ADELAIDE, MAY 1927.

No. 3.

FIELD NATURALISTS' TRIP THROUGH WESTERN VICTORIA.

By W. Ham and E. H. Ising.

(Continued)

After spending one night in Melbourne we went on to Mornington where we camped on the lawn of the hospitable home of Mr. and Mrs. Clarence Weber, who helped us spend a most delightful time. Balcombe's Bay, which gives its name (Balcombian) to a sub-division of the Oligocene period, proved a happy hunting-ground for fossils and the party spent some busy hours digging for these in the soft rock of the cliffs.

The botany of the beach is not at this season very productive of specimens. Tea-tree (*Leptospermum laevigatum*) covers the reserve along the cliffs and back of this runs the main road from Melbourne round to the entrance to the Bay.

Four days were spent at this delightful spot, the bathing on the sands of Fisherman's Beach being among the most pleasant memories. To Melbourne again and then out to Ballarat. At Keilor we stopped to collect fossil Graptolites from the shaly rocks. Graptolites flourished in the very early ages of the world and then disappeared, supplanted by higher forms of life. The Graptolite was a small sea animal living in colonies arranged along slender stems.

Our next stopping place was at Myrning where we secured some fossil leaves of ancient plants allied to the cinnamon and laurel of present times.

From Melbourne to Ballarat our road led us across the almost level plains covered with lava from the volcanic outburst of hundreds of vents and fissures. Previous to this outflow the landscape had been weathered into far more varied forms of hills and valleys but the melted rock welling out from many scores of fissures and craters filled the valleys and covered all but the highest hills with a uniform mantle of lava, which gradually cooled into the hard heavy dark rock called basalt or bluestone. Here and there the lava tide was thrown out with greater force by the steam pressure, and the lava instead of welling up quietly was broken into small particles, and fell in finely divided dust or mud, and rather larger particles of ash. This rain of ash falling

near the steam vent from which it was ejected, gradually built up a few volcanoes resembling in shape those of Mount Gambier. Around these centres the basalt was more easily weathered into deep soil, usually very rich, such as that on the flanks of Mt. Buninyong and Mt. Warrenheip. On these soils great crops of potatoes, onions, etc., are raised.



Map showing the lava field of Western Victoria. The Grampians are also indicated as well as the volcanoes of Mount Gambier and Mt. Schank.

Where the lava flowed out quietly in a liquid mass about as dense as treacle the process of weathering has progressed only for a short depth and the soil is usually shallow and in parts only moderately productive, though possibly 90 per cent. of the basalt has weathered into very productive soils.

Ballarat is a fine city. Its chief artery, Sturt Street, has plantations in the middle with one way traffic on either side. The street gardens are particularly fine. But the crowning glory of Ballarat is Lake Wendouree, just beyond the end of Sturt Street. It is a shallow lake formed like so many lakes in this part of Victoria in a hollow in the lava covering, possibly the result of caving in of the space below the lava. Here rowboats, sailing boats and motor boats dot the waters while the fisherman plies his gentle art all along the margin and with some success for a fish hatchery keeps the lake well stocked with fresh-water fish.

The Botanic Gardens are very beautiful and the statuary includes the magnificent "Flight from Pompeii" and many other fine examples of the sculptors art. The gold mines have ceased to work but decaying poppet heads, old whims and great heaps of spoil still mark the sites where the busy mines yielded their golden treasures in the roaring days. We were motored to the top of Black Hill, once the centre of the rich alluvial field. The hill has been cut through and thousands of tons of gold bearing rock have gone through the mills, now silent and abandoned.

At Ballarat under the expert guidance of Dr. Fenner we visited the site of the famous Eureka stockade, and at the Art Gallery in the City were privileged to handle the flag of the "rebel" army and to examine many interesting relics of the fight which had so momentous an influence upon the fate of our young country. The leader of the miners, Peter Lalor, who lost an arm in the fight, rose to be Speaker of the Victorian House of Assembly and his statue stands in Sturt Street.

Reluctantly we left Ballarat with its wealth of interesting associations and took the road for Ararat passing along an Avenue of Honour over eleven miles in length, each tree being dedicated to a soldier from the district who gave up his life in the Great War.

All the way from Ballarat to Ararat and thence on to Stawell we are journeying through the gold fields of seventy years ago. Even now the earth is everywhere dotted with the heaps thrown up by the alluvial miners in the early days and with the larger tips from the crushers of later date. A wonderful land, now overgrown with gum scrub, largely stringybark.

At Stawell we were most hospitably entertained by the Head Master of the High School and were able to make this our centre for the three days we were able to devote to the beauties of the Grampians. Stawell like Ballarat, is an old gold-mining town now gradually recovering some of its former importance by the employment afforded by its local tweed factory.

In many ways the Grampians are unique among the mountains of our Continent. They are formed of great blocks that have been tilted up so that the eastern side is a steep and rugged scarp-face, rising almost vertically from the plain while the western side presents a gentle slope. Three great ridges of hard sandstones and quartzites are thus tilted and the weathering of ages has worn all three into fantastic forms of cliff and valley. Luckily for the preservation of their beauty the quartzite has not worn down to tillable soil and the native plants still flourish, many species being peculiar to this locality.

The Grampians should be of great interest to all South Australians for from their rugged slopes comes the water that supplies the Murray lands and the South East with their fine underground water supplies. This was clearly proved by the patient investigations of Dr. C. Fenner as set out in his article on Mt. Gambier in a former number of the Naturalist. Victorian enterprise has conducted a fine water supply to the mallee lands of the north-west. Natural lakes have been extended and channels take the precious water into the heart of the mallee country giving the farmers a plentiful supply in even the driest seasons.

Good roads enable the motorist to penetrate the heart of the ranges and paths lead up to many peaks commanding fine views. The members of the party were privileged to climb Mount Victory and to view the wonderful panorama of mountains, and valleys stretching away into the blue distance.

On our way to Hamilton we attempted to climb Mt. Sturgeon, the southermost peak of the Grampians, but not far from the summit were stopped by absolutely unscaleable precipices which even Mr. Shorthose could not negotiate. Our stay at Hamilton was an exceedingly pleasant one, though we missed visiting the famous fossils-beds of Muddy Creek in its vicinity. The heat wave overtook the party at Hamilton and rendered the trip back to Adelaide anything but agreeable. We are greatly indebted to Mr. Shorthose to whose skill and care the success of the trip was entirely due. W.H.

Reaching the Grampians the native vegetation became more dense and varied and it was well named "the botanists' paradise." The rugged grandeur of the mountain chains is greatly enhanced by the glorious variety of trees and shrubs growing densely together. The scenery was quite up to expectations although, on account of limited time, we only saw a few of the beauty spots. A good variety of flowers were out but they were not conspicuous. Among the collection of flowers a very pretty reddish *Grevillea* was obtained and several yellow flowers of *Hibbertia*, *Acacia* and *Persoonia*. The Grampians gum (*Eucalyptus alpina*) was obtained from the tops of Mackay's Lookout and Mt. Sturgeon. This mallee only grows on the stony heights of the Grampian Peaks and was collected by Major Mitchell in 1836 on the top of Mt. William, 3980 feet, which he himself climbed. Many other gums were growing in the beautiful valley inside the eastern scarp. In this valley two creeks take rise, Fyan's Creek flowing north into the Wimmera and the Wannon flowing south into the River Glenelg. All the ranges which

make up the Grampians have a westerly slope. In many places the slope is just bare rock but where cracks have retained soil they have developed quite a mass of trees and shrubs which can be picked out in the distance as dark lines or bands.

Leaving the Grampians the country changes rapidly to an open woodland type, flat and less interesting. This continues through Hamilton and Coleraine. On to Harrow the trees form more of a forest in undulating country. Crossing the Glenelg River at the latter town there is the last change to a sandy soil with plenty of undergrowth with the stringybarks as the dominant trees. Tea tree (*Melaleuca* sp.) also occurs and is found in isolated patches. This type of country extends past Edenhope, Apsley and across the border to Naracoorte. It also extends now right across the state westerly to Robe.

E.H.I.

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SHELL COLLECTORS' CLUB.

The following shells were recently studied:—

Family MITRIDAE.

Over 200 living species of this family have been described, the shell being intermediate between *Volutidae* and *Marginella*. About 20 known species inhabit South Australian waters. Some of the tropical *Mitridae* are extraordinarily beautiful and contrast sharply with our largest plain specimens. The smaller S.A. *Mitridae*, however, are finely sculptured and colored.

Mitra glabra, Swainson, common, and may be collected on many of our beaches. About ten ascending, tightly-wound smooth whorls culminate in a sharp point, forming a turreted shell measuring up to $4\frac{1}{2}$ inches in length. Living specimens carry a thin brown periostracum. The shape of the shell, when dead and adrift, lends itself to easy rolling, which soon removes all traces of its protective skin, and produces the yellow specimens frequently found.

M. australis, Swainson, is smaller than the preceding, and may be distinguished by its alternating white and brown circular bands. In adult specimens the outer lip tends to become expanded. Four strong plications ascend the columella. The average length of a number collected was $1\frac{1}{4}$ inches.

M. rosettae, Angas, is a brown shell in several shades, about one inch in length. This *Mitra* is exceedingly common at Middleton, where hundreds are to be collected from the beach at certain times—living shells being taken from a reef towards Sandy Bay.

M. pica, Reeve, is credited to South-eastern beaches, and at Middleton, on rare occasions. A small, ventricose species of five whorls, colored dull brown and grey, the brown markings are scalloped on one edge.

Among the smaller *Mitridae* commonly collected are *M. schomburgki*, Angas; *M. vineta*, Adams; *M. tatei*, Angas; and *M. lincolniensis*, Angas. *M. perksi*, Verco, a comparatively uncommon variety, is pure white.

Family BUCCINIDAE.

Cominella eburnea, Reeve, a familiar shell on many beaches, inhabits the shallow pools at low tide, where it may be taken in quantity, especially if a little attractive bait is laid down.

C. lineolata, Lamarck, is also common, but is subject to considerable variation. At Middleton beach recently hundreds of living banded specimens were taken in company with the typical black spotted variety. Another *Cominella*, variety *lacteum*, is of a cream color, without bands or spots.

Family CONIDAE.

A very beautiful family of between four and five hundred species. The cones are noted for their brilliant coloration—a representative collection providing a feast of color. During life a dull, opaque, periostracum hides most of this decoration, and acts as a protective agent; thus the painting of this lovely home, which is not seen during the life of the shell, provides a mystery.

Conus anemone, Lamarck. A common shell and numbers are collected from the *Pinna* beds outside the Outer Harbor. In the absence of rocks, a congenial home is provided among these bivalves which are firmly planted in the sand. The dead valves lying about are shown distinct preference, especially when half filled with sand and mud. Many specimens were noted to have sustained extensive damage to their thin growing lip at certain periods of their existence, but neat repair quickly takes place. The shell of *C. anemone* varies considerably both in size and color. Some examples have a spire half the length of the shell; others, again are short and flattened. The average mature shell attains a length of two inches.

C. rutilus, Menke, is a small cone, found in colors merging between pink and brown. Its flattened spire is often prettily coronated.

C. seagravei, Gatliff, is more familiar to Victorian collectors, but it has been recently taken from a Yorke Peninsula beach.

F. TRIGG,

May 2nd, 1927.

Hon. Secretary, Shell Collectors' Club.

PLANTS OF THE ENCOUNTER BAY DISTRICT,
ADDITIONAL RECORDS.

By J. B. Cleland and J. M. Black.

Since we published our enumeration of the vascular plants of the Encounter Bay district in the "South Australian Naturalist" for February and May, 1925, a number of additional species have been collected by us and form the subject of this paper. The total number of plants now known for this district is approximately 674 (excluding 11 varieties), of which 546 are native and 128 are introduced species (the latter indicated by * before the name). Doubtless fifty or more, chiefly introduced or ephemeral spring species, remain to be recorded.

FILICALES.—*Pteris tremula*, R.Br., recorded by Mr. F. Ashby (Trans. and Proc. Roy. Soc. of S.A., L., 1926, p. 325), from a waterfall on the Upper Hindmarsh R. One of us in January, 1927, found several plants growing also in rock crevices near a waterfall on the northern side of the Inman Valley, a spot probably only about 3 miles distant from Mr. Ashby's locality.

POTAMOGETONACEAE.—*Cymodocea Griffithii*, J. M. Black. As stated by one of us in the "S.A. Naturalist" (VII, May, 1926) this is a distinct species and not synonymous with *C. antarctica*, (Labill.) Endl. Sea-coast of Encounter Bay. *Ruppia maritima*, L.—Brackish mouth of a creek on the Victor Harbour side of Pt. Elliot.

GRAMINEAE.—**Andropogon halepensis*, (L.) Sibth., Johnston Grass, Inman Valley; **Panicum Sanguinale*, L., Summer Grass, Victor Harbour; **Phalaris paradoxa*, L., Hindmarsh Valley in Black's Flora; *Stipa Macalpinei*, Reader, near Victor Harbour; **Koeleria phleoides*, Pers., Bluff; *Glyceria stricta*, Hook. f., on cliffs near the sea; **Festuca elatior*, L. var. *arundinacea*, Hack.; **F. rigida*, (L.) Kunth.

CYPERACEAE.—*Cyperus laevigatus*, L., in a pool of fresh-water from a spring on the shore to the west of Petrel Cove, amongst rocks within reach of very high tides, forming a bright green patch, Jan., 1926; *Schoenus brachyphyllus*, F.v.M. (= *Sch. brevifolius*, Benth. partly not R.Br.) In a swamp at Back Valley and on the Upper Hindmarsh; *Lepidosperma carphoides*, F.v.M., already recorded but out of place.

RESTIONACEAE.—*Hypolaena lateriflora*, (R.Br.), Benth., Back Valley.

CENTROLEPIDACEAE.—*Centrolepis polygyna*, (R.Br.) Hieron, cliffs west of the Bluff.

IRIDACEAE.—**Romulea rosea*, (L.) Eckl., near Middleton; **Sparaxis* sp., Encounter Bay, Sep.

ORCHIDACEAE.—*Dipodium punctatum*, R.Br., in *Eucalyptus obliqua* forest, road from Inman Valley to Hindmarsh Tiers and amongst *E. fasciculosa* on grassy hills above Middleton, Jan.; *Diuris palustris*, Lindl., Sep.

CASUARINACEAE.—Miss Macklin is investigating our dwarf species of *Casuarina*. It would appear as though there were three, if not four, distinct species in this district.

CHENOPODIACEAE.—**Chenopodium glaucum*, L., strand of the Inman and Hindmarsh Rivers; *Atriplex patulum*, L., on the strand, Victor Harbour, May; *A. cinereum*, Poir., Inman mouth, west of the Bluff; *Bassia uniflora*, (R.Br.) F.v.M., one plant found west of the Bluff; *Kochia crassiloba*, R. Anderson (= *Enchylaena villosa*, F.v.M.). Several plants found by the roadside on the neck of the Bluff.

AMARANTACEAE.—**Amarantus patulus*, Bertol.

PORTULACACEAE.—*Calandrinia calyptrata*, Hook. f., Bluff, Sep.

LAURACEAE.—*Cassytha pubescens*, R.Br., Inman Valley.

PITTOSPORACEAE.—*Marianthus bignoniaceus*, F.v.M., additional locality, road between Inman Valley and Hindmarsh Tiers.

LEGUMINOSAE.—*Pultenaea graveolens*, Tate, several neat shrubs about 4 ft. high in *Eucalyptus* forest on the highest part of the Inman Valley—Hindmarsh Tiers road, odour of leaves like that of curry; **Cytisus canariensis*, (L.) Steud., Canary Broom, near Middleton, Aug.; **C. prolifer*, L. f., Tree Lucerne, Inman Valley, Sep.; **Trifolium dubium*, Sibth. Hindmarsh. R., Jan.; **T. fragiferum*, L. var. *pulchellum*, Lange, Pt. Elliot in Black's Flora; **T. glomeratum*, L.; **T. subterraneum*, L., extensively cultivated; **Medicago sativa*, L., odd plants in sand near the shore; **M. minima*, (L.) Grubb.

GERANIACEAE.—*Erodium cygnorum*, Nees, hills, Sep.; * *E. cicutarium*, (L.) L'Her., Sep.

RUTACEAE.—*Correa calycina*, Black. The plants found amongst the rocks at the Upper Waterfall, Hindmarsh R., and recorded as *C. aemula* turn out to be a new species which one of us has described as above. The shrubs are sometimes 6 ft. high, rounded and dense. *C. aemula*, (Lindl.) F.v.M., has, however, been found near damp ground in stringybark forest on the road between Inman Valley and Hindmarsh Tiers.

POLYGALACEAE.—A species of **Polygala* has escaped from gardens and a few plants may be found on the Inman banks.

SAPINDACEAE.—*Dodonaea Baueri*, Endl., between Currency Creek and Middleton.

VIOLACEAE.—*Viola hederacea*, Labill., Back Valley, Jan.; *Hybanthus floribundus* (Lindl.), F.v.M., Back Valley, Sep.

- MYRTACEAE.**—*Callistemon salignus*, (Sm.) D.C., var. *australis*, Benth., Upper Hindmarsh R.; **Eucalyptus globulus*, Lab., establishing itself in the Upper Hindmarsh Valley.
- OENOTHERACEAE.**—*Epilobium junceum*, Sol.; *E. glabellum*, Forst., Upper Hindmarsh Valley; *E. pallidiflorum*, Sol., Upper Hindmarsh Valley.
- HALORRHAGIDACEAE.**—*Halorrhagis micrantha*, (Thunb.) R.Br., Back Valley near swamps; *H. acutangula*, F.v.M., several patches of plants on the sandhills between Victor Harbour and Port Elliot.
- UMBELLIFERAE.**—*Sium latifolium*, L. var. *univittatum*, J. M. Black, already recorded, has only been found growing in swampy soil near the upper waterfall, Hindmarsh River.
- EPACRIDACEAE.**—*Styphelia exarrhena*, F.v.M., scrubs towards Newland's Head; *S. exarrhena* var. *hirtella*, J. M. Black, recorded for Encounter Bay in Black's Flora (already recorded as *Leucopogon hirtellus*, F.v.M.); *Acrotriche depressa*, R.Br. between Currency Creek and Middleton; *Epacris im-* Hindmarsh River, since found in abundance below a waterfall.
- CONVOLVULACEAE.**—*Wilsonia Backhousii*, Hook. f., under tea-tree and shrubs in moist soil at the mouth of the Hindmarsh River.
- VERBENACEAE.**—*Verbena officinalis*, L.
- LABIATAE.**—*Scutellaria humilis*, R.Br., flowers pinkish red, leaves slightly hairy, already recorded for upper waterfall, Hindmarsh River, since found in abundance below a waterfall on the north side of the Inman Valley.
- SOLANACEAE.**—*Solanum aviculare*, Forst. f., Kangaroo apple, recorded in Black's Flora for towards Encounter B. A single plant found at Back Valley is probably this, though it may be *S. simile*, F.v.M.; **Physalis peruviana*, L., Upper Hindmarsh Valley.
- RUBIACEAE.**—*Opercularia ovata*, Hook. f., Hindmarsh Valley; *O. turpis*, F.v.M., Encounter Bay; *Asperula scoparia*, Hook. f., Bluff, Sept.
- GOODENIACEAE.**—*Scaevola suaveolens*, R.Br., forming a few patches about a foot high on sandhills between Victor Harbour and Port Elliot.
- COMPOSITAE.**—*Brachycome*, near *B. trachycarpa*, F.v.M. (not in fruit), Back Valley, Sept.; *Siegesbeckia orientalis*, L., Upper Hindmarsh River and waterfall on north side of the Inman Valley, Jan.; *Craspedia Richei*, Bluff, Aug., Sept.; *Rutidosia pumilo*, Benth., Bluff, Sept.; *Millotia tenuifolia*, Cass., Back Valley, Sept.; *Helichrysum semipapposum*, DC. Jan.; *Erechtites prenanthoides*, DC.; *Senecio hypoleucus*, Benth., off Inman Valley; **S. vulgaris*, L., Groundsel, Sept.; **Hypochaeris glabra*, L.

SOUTH AUSTRALIAN TREES (1)

No. 6. PINK GUM *Eucalyptus fasciculosa*, F.v.M.

By E. H. Ising.

I. GENERAL.

This Eucalypt was named by Mueller (2) in 1855 but Bentham (3) reduced it to a variety of *E. paniculata* and it was not until 1912 that Maiden (4) restored it to specific rank. It has received a number of common names such as Scrub, Hill, Sand, White and Dwarf White Gum but Pink Gum (5) is now generally recognised as its correct or appropriate vernacular name.

II. BOTANICAL.

E. fasciculosa, F.v.M. The species name means "a bundle" which refers to the inflorescence which takes the form of a panicle and is usually borne on the ends of the branchlets.

The Bark.—The bark is smooth although at times it is somewhat rough and scaly at the base. The lower part of the trunk appears mottled as a result of the bark being shed irregularly. The colour is pale to dark grey to brownish, the upper portion of the trunk is generally of a uniform pale grey as also are the branches.

The Leaves.—The leaves are 4 to 5 inches long on an average and about 1 inch broad; lanceolate, somewhat sickle-shaped; fairly dark green on both sides and shining.

The Buds.—The buds are short and bluntly pointed or conical, the lower part a little longer and tapering to a short stalk; about $\frac{1}{4}$ to $\frac{3}{8}$ inch long; new buds appear in April.

The Flowers.—The flowers are white, small with anthers opening by terminal pores. They yield good honey. Inflorescence paniculate. Flowering in June at Pt. Willunga and at Humbug Scrub in April, 1926.

The Fruits.—The fruits are egg-cup shaped, about $\frac{1}{8}$ to $\frac{1}{4}$ inch long with a depressed centre, valves deeply sunk.

III. GEOLOGICAL.

Owing to the wide range of this species it occurs in various geological formations. In the higher parts of the Mt. Lofty Range it is found on the Pre Cambrian quartzites and often occurs in stony hilltops and rises, Long Gully is an example of this kind.

In the lower part of National Park, Belair it grows on the ironstone rises and forms a small, stunted tree. At Finniss and Victor Harbor it is found in sandy soil on slopes where conditions are dry on account of the non-retentive soil. Similar con-



Photos, E. H. Ising. Figs. 1 and 2.—Pink gum (*Eucalyptus fasciculosa*) growing near Long Gully, National Park.

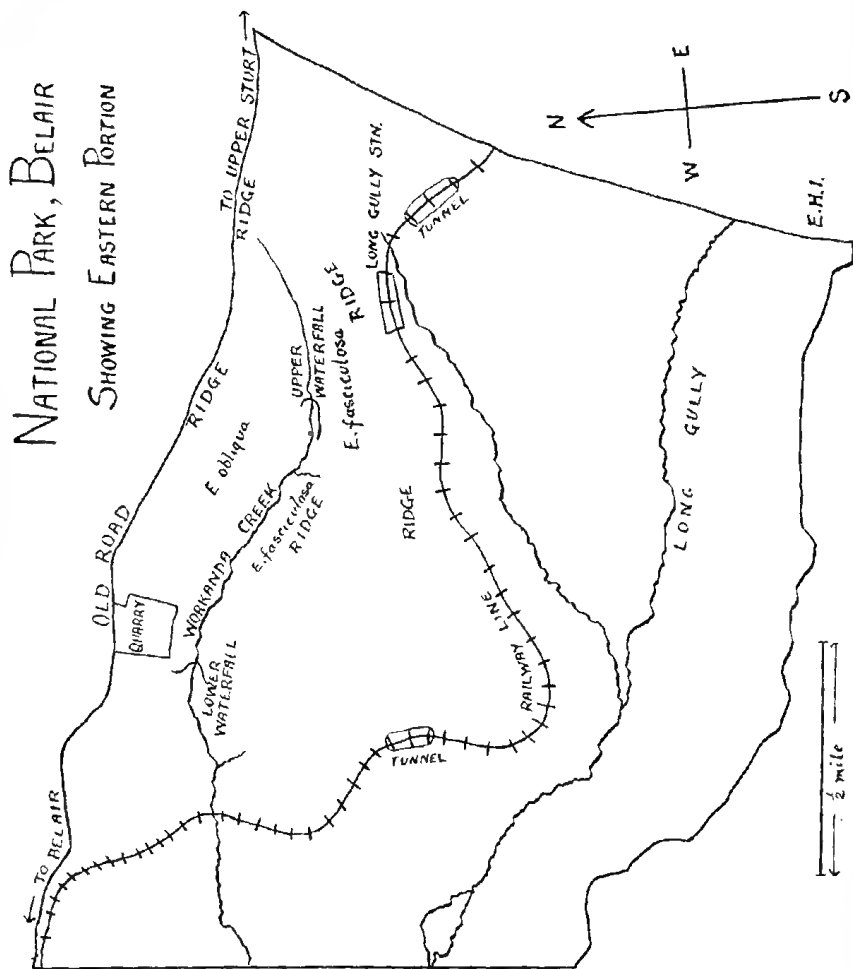


Plate 5. Showing eastern portion of National Park, Belair, Mount Lofty Range. The pink gum is locally dominant on the ridge and its slope facing north-east on the south-west side of Workanda Creek. It also favors the other ridges shown in the map.

ditions are met with in the mallee where, in the Monarto South district, this species grows over limestone with a sandy porous surface soil of Tertiary age.

The conditions here are very much drier with a less annual rainfall and a higher temperature in the summer than that of the Mt. Lofty Range.

The type of soil where the pink gum grows in the Kuitpo Forest has been given by Teale (6) as "shallow, light-coloured, fine-textured, sandy clay on very tight clay derived from Tertiary to Recent sands and clays" He notes that the pink gum grows in wet badly drained areas. This has not been our experience as all the habitats observed were well drained, thus proving the adaptability of this species to dry as well as wet situations.

In speaking of this species (as *E. paniculata*) J. E. Brown (7) says that it "appears to grow chiefly on sandy ironstone soils, noted from near sea level to over 1,000 feet."

In their paper on "The Ecology of the Eucalyptus Forests of the Mount Lofty Ranges (Adelaide District) S.A." Adamson and Osborn (8) record the pink gum growing in coarse ironstone soils, fine ironstone soils, glacial deposits and in shallow stony fine-grained soils produced from hard schists, crystalline quartzites and gneiss.

IV. ASSOCIATIONS.

The associations of the pink gum have been studied to a considerable degree in the Mt. Lofty Range particularly near Long Gully in National Park. Other places in the State have been visited and notes taken on the occurrence of this species. The various districts will be dealt with separately as conditions differ to a wide extent.

MT. LOFTY RANGE.

1. Long Gully.—This area comprises 3 or 4 square miles to the north of Long Gully Station and is in the eastern corner of National Park. The piece of forest under review consists of two parallel ridges extending from the eastern corner of the Park in a south-easterly direction of about one mile and of a ridge running across the higher end of the other two ridges at right angles in a south-westerly direction. In the main this area is a stringybark forest with *Eucalyptus obliqua* as the dominant species but the pink gum almost attains local dominance in a situation on a ridge top and extending half way down its north-eastern slope. The pink gum is often found in rocky ground, such an occurrence was noted on the ridge by the old Belair road, the boundary of the Park, where this gum appeared as soon as this class of ground was reached. Just here the stringybarks combined with

the pink gum and going down the slope facing south-west the latter tree gave place to stringybark which completely dominated this situation. An exact duplicate of this occurred on the parallel ridge further in the Park to the south-west. The pink gum is confined to the higher ground, even on ridges, as on the end of one ridge which gradually falls away it is replaced by the yellow gum.

Associated with the pink gum along the ridges are shrubs of *Acacia pycnantha*, *Pultenaea diaphnoides* and undershrubs of *Hibbertia stricta*, *H. sericea*, *Astroloma humifusum*, and *Acrotriche serrulata* and a few of such plants as *Brunonia australis*, *Halorrhagis tetragyna*, *Tetratheca pilosa*, *Hypericum gramineum* and *Leucopogon* sp. A tree or two of the native cherry (*Exocarpus cupressiformis*) is to be seen also. The ground along the higher part of one ridge, which runs in a north-westerly direction, is fairly level and has an open formation of pink gum, which is the only tree over great part and an abundance of *Lissanthe strigosa* and *Hibbertia stricta* are found with it. Going up a gentle rise the pink gum continues to dominate the tree stratum and *Hibbertia* species accompanies it. The yellow gum and the stringybark now intermingle as the ridge slopes down until the pink gum disappears. The mistletoe (*Loranthus Miquelii*) was observed here on the pink gum.

The north eastern slope of this ridge has two main species of gum trees, in the higher portion near the top waterfall of Workanda Creek the pink gum predominates and in the lower part the yellow gum is almost the only tree except for an occasional stringybark, and *Acacia pycnantha* occurs in both situations while *Hibbertia stricta* is found in the first and *Hibbertia* species in the second. Around the foot of this ridge the yellow gum is accompanied by *Acacia pycnantha* and *Hibbertia stricta*.

Along the higher part the waterfall cliff extends for a considerable distance and in the rocks a daisy shrub (*Olearia ramulosa*) finds a congenial home, as also does *Indigofera*.

Above the top waterfall the pink gum extends up the flat mixed with manna gum and stringybark with shrubs of *Leptospermum scoparium*. In one place there is a dense growth of golden wattle (*Acacia pycnantha*) among some pink gums with a floor covering of *Hibbertia sericea*. The pink gum disappears further up the head of the gully and its place is taken by trees of manna gum, stringybark and blackwood (*Acacia melanoxylon*).

As noted before, the south-western slopes are dominated by the stringybark and only an occasional pink gum is seen. The golden wattle forms the large shrub stratum with an occasional small tree of the native cherry, while the ground stratum

consists chiefly of *Hibbertia sericea*, *H. stricta*, *Astroloma humifusum*, *Acrotriche serrulata*, *Acaena sanguisorbae* and *Pteridium aquilinum*. On the lower parts the manna gum comes in and *Acrotriche fasciculiflora* may also develop here.

A ridge running north-east, situate at right angles to the other two ridges referred to previously, was traversed from the lower part to the higher where it merges with the other two. Here again the pink gum is found but it is not so abundant as the stringybark. The golden wattle is still plentiful and there are a few plants of *Banksia marginata* and the native cherry. A teatree, *Leptospermum myrsinoides*, grows here plentifully, also the two small guinea flowers *Hibbertia sericea* and *H. stricta*. An old base of a pink gum was seen on this ridge and including the swollen part (which appears to be characteristic of the large trees) it measured 8 feet across at ground level. Only the stump remained and although the middle was burnt out young saplings had grown up from it. It is remarkable that, just where a little dip or hollow occurred along this ridge, the yellow gum grew and it was seen nowhere else.

Near Long Gully Station the pink gum was growing along a ridge and, besides the plants already mentioned as occurring in a similar situation, there were *Stackhousia monogyna*, *Pultenaea largiflorens*, *Dillwynia hispida*, *Dichopogon strictus*, *Crassula*, *Ranunculus lappaceus*, *Caladenia carnea* and *Levenhookia dubia*.

2. Stirling East.—There is a small ridge running south-east between Stirling main road and the Stirling creek which has a little natural vegetation on it. On the north-east slope the pink gum occurs from the top to almost the bottom. On the top of the ridge it has the stringybark and manna gum associated with it also the native cherry and the grass tree, *Xanthorrhoea semiplana*. In the lower part the yellow gum accompanies it and the following other plants:—shrubs of golden wattle, *Pultenaea daphnoides* and small perennials such as *Tetratheca pilosa*, *Astroloma humifusum*, *Scaevola microcarpa*, *Poranthera microphylla* and *Themeda australis*.

A short distance from the previous situation the pink gum was noted growing on low ground by Stirling Creek and on the eastern end slope of a ridge which was dominated by stringybark.

3. Upper Sturt. Observed along the top of a ridge growing as isolated specimens with the stringybark.

4. Yantaringa near Bridgewater.—The pink gum was found growing here on a steep hillside facing west. The hills were composed of clay slates and were close to the junction of the

quartzite hills on which the stringybark grew. Associated with the pink gum here were the native cherry, yellow, red, manna and candlebark gums.

5. Millbrook.—Growing on the top of ridges composed of clay slates with long-leaf box as the dominant tree and the pink gum as sub-dominant. The following plants were associated with the pink gum:—Native cherry, *Acacia pycnantha*, *A. obliqua*, *Xanthorrhoea semiplana*, *Hibbertia sericea*, *H. stricta*, *Daviesia ulicina*, *Platylobium obtusangulum*, *Dianella revoluta* and *Lepidosperma* sp.

6. Birdwood.—In an open woodland formation on the top of a hill the pink gum is associated with the yellow gum, golden wattle, *Dodonaea viscosa*, *Bursaria spinosa*, *Hibbertia sericea* and *Cheilanthes tenuifolia*. The parasitic mistletoe, *Loranthus Miquelii*, was growing on the pink gum at this place.

7. Victor Harbor.—The pink gum was observed on sandy rises amongst fairly dense scrub consisting of *Leptospermum*, *Hibbertia*, *Calythrix tetragona* and *Xanthorrhoea semiplana*.

8. Finnis. This place is situated at the foothills of the eastern slope of the Mount Lofty Range and it is here that the flora of the hills and the mallee plains meet. On a fairly extensive sandy flat the pink gum grows in open formation and develops a large girth rather than height. In this situation it is accompanied by the peppermint and *Acacia* sp. To the north of the township the sandy plain is still in its native state except that the biggest trees have been cut out. This is typical mallee scrub and besides the large number of shrubs of all sizes and some annuals there are the following mallees:—

Giant mallee, *E. incrassata*; *E. dumosa*; white or red mallee, *E. gracilis*; oil mallee, *E. oleosa*; *E. leptophylla*.

9. Morialta. The pink gum grows here on the steep north side of the gorge and is associated with *Casuarina stricta*, *Spyridium spathulatum*, *Dodonaea viscosa*, *Xanthorrhoea quadrangulata*, *X. semiplana*, *Banksia marginata*, *Olearia ramulosa*, these were abundant and the following were not so plentiful, *Astroloma conostephioides*, *Cheilanthes tenuifolia*, *Dichondra repens* and *Hibbertia sericea*.

MURRAY VALLEY.

1. Monarto South and Kinchina.—These places are situated on the eastern side of the Mount Lofty Range, the former is on a sandy, limestone plain which extends most of the way from the foothills to the River Murray. A small rocky ridge is met with where Kinchina is situated being about 5 miles from the former place. In an early number of this Journal (9) I have given some plant relationships of the pink gum.

V. DISTRIBUTION.

The pink gum has a fairly wide range as will be seen from the localities given below. It spreads from the coast (Pt. Willunga) and foothills into Mount Lofty Range to almost the highest parts and then over the range down the eastern slope to the Murray valley mallee beyond. This gives a range from about sealevel to about 1,700 feet and down again to the low-lying mallee plains which are very little above sealevel. This tract of country is 60 miles in width and comprising as it does plains and a mountain range its rainfall is of a varied nature. The rain on the plains is from 12 to 20 inches while that in the range is 44 inches average. It is remarkable that the pink gum should grow in the dry mallee country, which has an average rainfall of 12 inches, and also in the wettest part of Mount Lofty Range which receives four times as much rain. The fault-blocking of the range towards the west may account for the distribution of the pink gum in this direction but as all the gums are not so widely distributed this theory may not hold good unless those not so distributed are of later origin. It is impossible to explain why the pink gum also extends so far easterly from its optimum habitat; it may be that geological factors were similar in both districts a long time ago and as living conditions and environment changed so the gums adapted themselves to the varying phases obtaining.

MOUNT LOFTY RANGE.

(a) Seacoast to Foothills.

Pt. Willunga, on old sandy river flats in fair quantity with *Casuarina stricta* and scrub growth; Willunga, (J.H.M. and J.M.B.) (10), on stony hills; Finniss, in mallee type of country bordering the foothills; Victor Harbor, on sandy rises with dense scrub not far from the sea; Houghton, (J.H.M. and J.M.B.); Teatree Gully, (J.M.B.); Blackhill and Morialta (J.M.B. and ourselves); Brown Hill Creek, (J.M.B.).

(b). Lower Range up to 1000 ft.

Torrens Gorge (J.M.B.); Humbug Scrub on higher hill tops; Millbrook; Birdwood, on top of hill; Sandy Creek (J.H.M.); Mount Pleasant; Kangarilla, type district and Clarendon (J.E.B.); Encounter Bay District (J.B.C.).

(c). Higher Range up to about 1650 ft.

Ashbourne, Blackheath near Mt. Torrens, Bridgewater and Myponga (J.M.B.); Yantaringa near Bridgewater; Aldgate and Kuitpo Forest (J.H.M.); Long Gully up to about 1500 ft; Stirling East up to about 1650 ft.

Mallee Districts—Monarto South and Kinchina; Tatiara Country (J.H.M.)

South East—Lacepede Bay (F.v.M.)

Kangaroo Island—Near Cape De Coudie (J.M.B.); K.I.
without locality (F.v.M.)

VI. FORESTRY AND TIMBER.

This species cannot be regarded as a timber producer as it does not usually grow to any size. Ewart (11) gives the height as 30 feet and the tree shown in Fig. 1 is about 50 feet high and quite 3 feet diameter breast high. In the large number of trees seen in National Park and elsewhere only two of these dimensions were met with. Two big specimens, quite 3 feet in diameter, are illustrated by Gill (12) growing naturally in the forest at Meadows. The tree usually grows with a crooked trunk but as the timber is hard and weighs up to 67 lbs. to the cubic foot it was planted in the forest at Kuitpo (13) in the hope that it would grow a straight bole of commercial value. Four thousand seedlings were transplanted and only 30 were lost the first year. The timber is a deep reddish brown and is used for fencing, firewood and for wheels and coach building when good timber is available.

DESCRIPTION OF PLATES

Plate 4. Fig. 1.—Pink gum growing on the northern slope near the top of a ridge in the eastern corner of National Park, near Long Gully, Mount Lofty Range. This community occurs in the stringybark forest where *E. obliqua* is the dominant species with the yellow gum, golden wattle and *Hibbertia sericea* as associates.

Plate 4. Fig 2.—Showing the trunk of the Pink gum in Fig. 1. Note the bulbous swelling or rootstock at the base of the trunk.

REFERENCES.

1. No. 5 appeared in this Journal Vol. VII, No. 4, p. 93.
2. Trans. Vict. Inst., 34.
3. Flora Australiensis, III, p. 212.
4. Critical Revision of the genus *Eucalyptus*, Vol. II, Part 4 (1912).
5. The botanical names of the various species of *Eucalyptus* referred to in this article by their common names are as follow:—Pink gum, *E. fasciculosa*, F.v.M.; Stringybark, *E. obliqua*, L'Herit.; Yellow gum, *E. leucoxylon*, F.v.M.; Manna gum, *E. viminalis*, Labill.; Long leaf Box, *E. elaeophora*, F.v.M.; Peppermint, *E. odorata*.
6. Bull. 6, Dept. Forestry, Adelaide Univ., 1918, by E. O. Teale.

7. Forest Flora of S.A., Part 5., J. E. Brown.
8. Trans. Roy. Soc. S.A., Vol. 48 (1924) p. 101, etc.
9. Vol. 1, No. 2, p. 29..
10. The authorities for these localities are as follow:—J.H.M.—Maiden's work, see 4 above; J.M.B.—Mr. Black's herbarium; Benth.—Flora Australiensis; J.E.B.—Brown's work, see 7 above; F.v.M.—Eucalyptographia.
11. Handbook of Forest Trees for Victorian Foresters by Prof. A. J. Ewart, D.Sc. etc., 1925, p. 307.
12. Annual Report Woods and Forests Department, S.A. by Walter Gill, F.L.S., F.R.H.S., 1918-19, Fig. II.
13. Ibid, 1912-13.

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WILD FLOWER SHOW, SEPTEMBER 23 and 24, 1927.

Members and others are reminded that our annual Show is 3 weeks earlier this year and that we shall require as many wildflowers as possible from various parts of the State. Those who have "country cousins" are invited to enlist their practical help by sending a parcel of flowers. Interstate Clubs are hereby notified of our fixture and are invited to advise the date of their annual displays so that we may reciprocate in the matter of exhibits. Our members are invited to make suggestions of special items for display at the Show and for improvements on our past efforts.

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ADDITIONS TO THE HERBARIUM.

1. Wirrulla School, Eyres Peninsula, Head Teacher, Mr. L. J. Kesting, a parcel of 41 specimens collected as follows:—By Mavis Elefson, 25 specimens among which 6 rare ones, viz., Billy button (*Gnephosis skirrophora*); Teatree (*Melaleuca pauperiflora*); Wild fern (*Swainsona laxa*); Yellow everlasting (*Helipterum Haigii*); Prickly tomato (*Solanum hystrix*) and Camel Bush (*Teucrium sessiliflorum*). By Lionel Mudge, 9 specimens, of which four were rare, viz., Billy button, (*Gnephosis skirrophora*); camel bush (*Teucrium sessiliflorum*); purple bell (*Eremophila Weldii*); wild honeysuckle (*E. alternifolia*, var. *latifolia*). By Alex Lovegrove, 6 specimens and one was rare, viz., white daisy (*Olearia magniflora*).

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MORIALTA PUBLIC RESERVE.

It is proposed in following numbers of the "S.A. Naturalist" to publish a comprehensive account of the physiography, geology and botany of this area. Additional information will be very acceptable.

REVIEW OF "FLORA OF SOUTH AUSTRALIA"

Part III, *Meliaceae-Scrophulariaceae*, by J. M. Black.

There are a large number of illustrations in this volume which are particularly valuable for identifications. The author has followed the excellent system of giving drawings to illustrate generic distinctions in the various families and all the big families are so treated. The drawings are in one block and they are situated between the description of the family and the key to the genera. This is absent in the first volume and with advantage might be given as a supplement.

A vast amount of research must have been undertaken by Mr. Black to discover the correct botanical name of many of the species. Descriptions of plants must conform to rules laid down for the guidance of authors otherwise they are not valid; there are a few exceptions and as these are published no trouble need be occasioned thereby. Sometimes well-known names have to be discarded so that the correct and valid name may stand. For instance *Stackhousia linariifolia* was named 21 years earlier as *S. monogyna*, and as it conformed to botanical rules the latter name is the correct one. In *Rhamnaceae* the genera *Cryptandra* and *Spyridium* are kept separate Mueller had united these two under the former name. By a careful dissection and study of Tate's *Corchorus longipes* in the family *Tiliaceae*, Mr. Black came to the conclusion that this plant was sufficiently distinct for the creation of a new genus which he has called *Hymenocapsa*. The "Desert Kurrajong", *Brachychiton Gregorii*, F.v.M. (*Sturculiaceae*) is a distinct plant from the "Kurrajong" of the Eastern States. The genus *Hibbertia* in *Dilleniaceae* has received special attention by the author, who has created 2 new species and 5 new varieties, thus facilitating the identification of this variable genus.

In *Myrtaceae*, Mr. Black has followed Bentham ("Flora Australiensis") in dividing *Eucalyptus* by means of their anthers. This appears to be a very satisfactory arrangement and is, perhaps, the least variable character in a recognised variable genus. Illustrations of the anthers are given but very little else in this genus and the value of the part would have been greatly enhanced by the inclusion of drawings of our principal commercial species.

This part further enhances Mr. Black's reputation as one of the leading Australian botanists and the final part is eagerly awaited.

E.H.I.

EXCURSION TO HALLET'S COVE, MARCH 19, 1927.

A large party travelled to the Hallett's Cove Station and under the expert guidance of Dr. C. Fenner, F.G.S., examined the various outcrops of the Permo-Carboniferous till, viewing with special interest Tate's Rock, the first discovery. The leader's addresses were listened to with great interest and in conjunction with the specially prepared map made very clear the many points of scientific interest connected with the Cove.

EXCURSION TO ALDGATE, MR. F. H. SNOW'S, MARCH 26, 1927

Under the leadership of Mr. W. H. Selway a number of members visited the garden of Mr. F. H. Snow and were delighted with views of the trees and shrubs dressed in their wonderful autumn foliage, which has been particularly beautiful this season.

EXCURSION TO EDEN AND STURT RIVER, APRIL 2, 1927

Professor Walter Howchin, F.G.S., undertook to act as leader and a large party travelled to Eden Station by train and followed the professor down the gorge leading to the Sturt River. The leader gave a simple and very interesting account of the Cambrian ice-age and the deposition of the till with its included erratics adding a summary of the geological history of this part of South Australia, referring particularly to the recurrence of a second ice-age in Permo-Carboniferous times (of which traces are left in the till at Hallett's Cove). The members greatly appreciated the fine address particularly as coming from the discoverer of this important formation. A vote of thanks was enthusiastically awarded the veteran leader.

EXCURSION TO PORT WILLUNGA, APRIL 25, 1927

Mr. W. J. Kimber led a large party out on the reefs and along the fossil cliffs of this beautiful bay. Many forms of life were examined on the reef and a great many fossils were unearthed in the cliffs. The leader's intimate knowledge of all these was a source of interest and pleasure to the whole party, who were also greatly interested in the story of the wreck of the "Star of Greece". The day was perfect and the whole trip thoroughly enjoyable.

EXCURSION TO MORIALTA, MAY 14, 1927.

A large party climbed the path on the North side of the gully and with two of the three falls in full sight the leader, Mr. W. Ham, outlined the physiography and geological history of the gorge emphasising the work of long continued weathering in producing the gorges, canyons and valleys of the world.

VISIT TO Dr. A. W. HILL'S, MAY 21, 1927.

The president, Mr. W. Champion Hackett, F.R.H.S., was the leader of a party of members, who accepted the kind invitation of Dr. Hill to his house when the doctor very interestingly on "A Trip to the South Seas". His remarks were rendered doubly interesting by his fine collection of curios from the islands and by excellent lantern views of the scenery. The ceremony of Kava making, serving and drinking was gone through and explained. The party also inspected the doctor's famous collection of walking sticks made by himself as a hobby. Members greatly enjoyed the visit.

LECTURE BY MISS MACKLIN, B.Sc., ON "SEA-WEEDS", MARCH 15th, 1927.

A good attendance was present and Miss Macklin gave a fine informative address on the subject.

LECTURE "A CARAVAN TRIP TO WESTERN VICTORIA," BY Dr. C. FENNER AND Messrs. E. H. ISING AND W. HAM.

Mr. Ising spoke on the botany of the trip and was followed by Mr. Ham who dealt with the volcanoes and basalt plains of Western Victoria. Dr. Fenner followed with a description of the Grampians, their physiography and geological formation. Mr. Shorthose had brought his movie apparatus to show the members pictures taken on the trip. Unfortunately the electric lights failed and the exhibition had to be postponed.

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OUR EXCHANGES.

"The Australian Museum Magazine." Vol. III. No. 2. An article on the Queensland lung-fish will be of special interest to our members.

"The Victorian Naturalist." February, March, April and May numbers. Mr. Pescott continues his description of the Orchids of Victoria.

"The Australian Forestry Journal" for January and February. Among the many interesting items is an appreciative and well-illustrated article on the elementary school of forestry conducted each year at Kuitpo, S.A.

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The Journal of the Field Naturalists' Section of the Royal Society of South Australia.

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EXCURSIONS.

Sept. 3—Kingston Park Reserve. Train to Marino, 1.37 p.m. Botany, etc.
Leader, Mr. J. A. Hogan.

10—Botanic Garden. Entrance, 2 p.m. Australian Plants. Leader, Mr. J. F. Bailey, Director of the Botanic Garden.

17—Kinchina. Train, 8.05 a.m. Mallee, Birds, and Botany. Leader, Mr. E. H. Ising.

(Please note change of dates of these two excursions).

23 and 34—FLOWER SHOW. Town Hall. All members asked to attend at any convenient times from 7 pm. on Thursday, September 22 to 11 p.m. on Saturday, September 24.

Oct. 1—McDonald's Station, on Glenelg Line. Pond Life. Take Railway Bus, 2 p.m. Leader, Mr. A. G. Edquist, Nature Study Supervisor, Education Department

8—Warpoo (near Lyndoch), Rail Motor, 11.20 a.m. Botany. Leader, Mr. E. H. Ising.

12—(Eight Hours Day)—Warren Reservoir. Charabanc, 9 a.m. from Town Hall. Aquatic Life. Leaders, Mr. T. W. Nettelbeck and members of Aquarium Society

Please note that seats in Charabanc for Eight Hours Way (October 12) will be reserved on the purchase of tickets, which should be obtained at least two days beforehand. They may be obtained from Mr. B. B. Beck at Cole's Book Arcade, Rundle Street, where also subscriptions may be paid

LECTURES.

Sept. 20—Mr. T. P. Bellchambers. "The Mallee Fowl and other forms of wild life".

Oct. 18—Microscopic Evening. Dr. C. Fenner, Prof. T. H. Johnston, D.Sc., Messrs. W. A. Harding, J. F. Bailey, W. J. Webb and others.



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THE PLANTS OF THE ENCOUNTER BAY DISTRICT

NOTES ON THE ECOLOGY (Continued*)

By J. B. CLELAND, M.D.

II. SALT-WATER ESTUARIES.

These comprise the mouths of creeks and rivers, such as the Hindmarsh, the Inman, Waitpinga Creek, etc. In summer-time the exits are usually blocked by sand. Depending on whether high tides have recently poured into the mouths or heavy rain has descended on the catchment areas, the water will vary from salt through brackish to nearly fresh. Salt-impregnated muddy flats or sand surround the water to a varying and usually only slight extent. At Waitpinga the exit is through sandhills which tend to obstruct and close the channel. Clay cliffs of low height adjoin the streams of the Hindmarsh and Inman close to their mouths.

Two vascular plants live in the deeper water of the Hindmarsh mouth, viz. *Zostera*, probably *Z. nana*, with leaves up to 18 inches in length with a mere depression, barely a notch, at their summits and *Althenia* (*Lepilaena*)? sp. (not in flower). The plants on the shore vary according as this is liable to inundation, is sandy or forms a bank. On the latter *Myoporum insulare*, *Casuarina stricta* and *Bursaria spinosa* may grow. The Paperbark Tea-tree *Melaleuca halmaturorum* grows on soil liable to flooding at the mouths of the Inman and Hindmarsh. The reed *Phragmites communis* grows in the water near the edge. Small communities of the rush *Juncus maritimus* var. *australiensis*, *Salicornia australis*, *Threlkeldia diffusa*, *Suaeda australis*, *Plantago coronopus*, *Apium australe* and the grass *Sporobolus virginicus* are found in varying amount in low-lying parts often partly under water. *Triglochin striata* grows in shallow water or in moist mud. *Mimulus repens* and *Selliera radicans* also grow in moist mud or damp places but probably where the water is fresher, a situation in which *T. striata* also may be found. The zone of occasional inundation passes insensibly into higher parts less liable to flooding by salt or fresh water and here may be found

amongst the more abundant plants *Distichlis spicata*, *Cladium junceum*, tussocks of *C. filum*, *Lepidosperma gladiatum* (favouring sand), *Spergularia marginata*, *Samolus repens*, *Frankenia pauciflora* and Barley Grass. At the mouth of the Hindmarsh River are several large bushes of 'polygonum' (*Muehlenbeckia Cunninghamii*). *Wilsonia Backhousei* grows abundantly, rooting and creeping, under the Paper-bark Tea-trees and amongst herbs and undershrubs on the low land and banks at the mouth of the same river. *Plagianthus spicatus* grows in flat sub-swampy land under the Tea-trees near the Inman mouth. *Acacia rhetinodes* appears as a few plants, derived from seed washed down from higher up, on flats a little distance from the mouth of the Inman. *A. longifolia* var. *sophorae* grows on adjacent low sand-hills at the Hindmarsh mouth and almost forms thickets in similar situations near the mouth of Waitpinga Creek.

The following list includes plants, 43 in number (introduced species*) represented in some instances by only occasional individuals:—*Zostera*, probably *Z. nana*, *Althenia?* sp., *Triglochin striata*, *Sporobolus virginicus*, *Phragmites communis*, *Distichlis spicata*, **Hordeum*, *Scirpus nodosus*, *Cladium junceum*, *C. filum*, *Lepidosperma gladiatum*, *Juncus maritimus* var. *australiensis*, *Caesuarina stricta*, *Muehlenbeckia adpressa*, *M. Cunninghamii*, *Rhagodia baccata*, *Rh. nutans*, *Chenopodium glaucum* (on the strand at the Hindmarsh mouth), *Suaeda australis*, *Enchylaena tomentosa*, *Threlkeldia diffusa*, *Salicornia australis*, *Mesembrianthemum aequilaterale*, *Tetragonia implexicoma*, *Spergularia marginata*, *Bursaria spinosa*, *Acacia rhetinodes*, *A. longifolia* var. *Sophorae*, **Melilotus indica*, *Plagianthus spicatus*, *Frankenia pauciflora*, *Melaleuca halmaturorum*, **Foeniculum vulgare*, *Apium australe*, *Samolus repens*, *Wilsonia Backhousei*, *Mimulus repens*, *Myoporum insulare*, **Plantago lanceolatus*, **P. coronopus*, *Selliera radicans*, **Hypochaeris radicata* and **Sonchus oleraceus*.

IV. CLIFFS OVERLOOKING THE SEA.

Sea-cliffs of varying height, broken occasionally by little sandy beaches and occasionally, as at Waitpinga and Tunkalilla, by beaches more than a mile in length, extend from the Bluff nearly to C. Jervis. Those near the Bluff are low and easily scaled but after passing King's Point they rapidly increase in height, reaching probably nearly 200 ft., and soon become almost perpendicular, so continuing to Newland's Head after which comes Waitpinga Beach. The cliffs beyond have not yet been studied botanically so that this account refers to the eastern

*Vide Vol. VII, No. 2, Feb., 1926, p. 51, and No. 2, May, 1926, p. 80.

portion of the botanical zone. The aspect is a southern one, so that in many places there is a considerable protection from the sun. The plants of the lower cliffs and of the bases of the high ones are more or less exposed to sea-spray or in summer to a deposition of fine salt crystals from the drying effect on the small particles of salt-water blown off by a southerly breeze. At times this fine dust can be seen as a haze blown landwards. Geologically, Sir Douglas Mawson tells me, the cliffs near the Bluff are hornstones, which gradually change as one proceeds westwards to less altered ancient sediments including slates, phyllites and quartzites. Varying quantities of soil give root-hold for plants amongst the boulders and rocks.

Owing to the nature of the "terrain", no species of plant "has it all its own way" so as to be dominant over appreciable areas. Many in the accompanying list are represented by only occasional specimens, or really overlap from the strand formation or the adjacent grassy hill-slopes or scrub. Amongst the more characteristic and abundant plants are the grass *Poa caespitosa*, the scrambling *Muehlenbeckia adpressa*, *Rhagodia bacata* as a diffuse undershrub sometimes quite a striking object when covered with its crimson fruits, *Enchylaena tomentosa* with spreading habit, the berries mostly yellow, *Mesembriathemum australe*, *Spergularia marina* on the lower levels, *Pelargonium australe* quite attractive in appearance, *Nitraria Schoberi* as occasional tall shrubs, *Correa alba* not common and probably with its white flowers the prettiest plant of this formation, *Myoporum insulare* as occasional tall shrubs, *Senecio odoratus* var. *obtusifolius* characteristic in places and quite ornamental, *Ixiolaena supina* of subcreeping habit, characteristic of this situation as are the rounded low compact greyish-white plants of *Calocephalus Brownii*, and *Helichrysum apiculatum* which is not common but in this situation the leaves are unusually large, fleshy and broad.

Towards Newland's Head, where the cliffs are very high and the intact scrub reaches to their edge, plants from the latter descend to a considerable extent thus making additions to this zone. Thus the upper slopes show occasional stray mallee-like Eucalypts, *Melaleuca decussata*, a *Pultenaea*, *Eutaxia microphylla*, *Spyridium* and *Brachyloma ericoides*. Here are numbers of plants of *Cassinia aculeata* whose whitish phyllaries remain attached long after the flowers are over. The very beautiful, nearly prostrate, coral-pink *Correa rubra* var. *glabra* is relatively abundant in flower in May. The buds are Old Rose (Ridgway's Colour Index, Pl. XIII), the flowers Coral Pink to Light Jasper Red

(Pl. XIII). *Olearia ramulosa* is also common. *Acacia verticillata*, *Kunzea pomifera* and *Grevillea lavandulacea* (with very narrow sharp leaves) are scattered amongst the other shrubs. *Dichondra repens* nestles in protected situations.

The following is the list of the plants, 69 in number, so far noted for this area:— *Rottboellia compressa*?, *Spinifex hirsutus*, **Briza maxima*, *Distichlis spicata*, *Poa caespitosa*, *Glyceria stricta*, *Scirpus nodosus*, *Lepidosperma gladiatum*, *Dianella revoluta*, *Grevillea lavandulacea*, **Rumex acetosella*, **R. sp.*, *Muehlenbeckia adpressa*, *Rhagodia baccata*, *Rh. nutans*, **Chenopodium murale*, *Ch. carinatum*, *Atriplex cinereum* (on the strand), *Salsola kali* (on the strand), *Enchylaena tomentosa*, *Mesembrianthemum aequilaterale* (on the tall cliffs), *M. australe*, *Spergularia marginata* (at the base), *Cakile maritima* (on the strand), *Acaena sanguisorbae*, *Acacia verticillata*, *Eutaxia microphylla*, *Pultenaea sp.*, **Melilotus indica*, *Pelargonium australe*, *Oxalis corniculata*, **O. cernua*, *Nitraria Schoberi*, *Correa alba*, *C. rubra* var. *glabra*, *Spyridium sp.*, *Pimelea glauca*, *Kunzea pomifera*, *Melaleuca decussata*, *Eucalyptus sp.*, *Apium australe*, *Brachyloma ericoides*, *Leucopogon parviflorus* (Richei), **Anagallis arvensis*, *Dichondra repens*, *Solanum nigrum*, **S. Sodomaeum*, *Nicotiana suaveolens*, **Linaria Elatine*, *Myoporum insulare*, *Plantago varia*, **Citrullus vulgaris* (Pic Melon, one plant only), *Scaevola microcarpa*, *Goodenia amplexans*, *Olearia ramulosa*, *Senecio lautus*, *S. odoratus* var. *obtusifolius*, *Ixiolaena supina*, *Cassinia aculeata*, *Helichrysum apiculatum*, *H. lucidum* (on top of the low cliffs near the Bluff), *Calocephalus Brownii*, **Cryptostemma calendulaceum*, **Hypochaeris radicata*, **Picris hieracioides* var. *squarrosa*, **Sonchus oleraceus*, *S. asper* var. *littoralis*.

MORIALTA RESERVE.

The Morialta Falls Reserve was bought by the Government in November, 1912. 225 acres were purchased for £2,500, and 300 acres were given by the owner.

Let us, in imagination visit the Gorge. Walking a little past the Kiosk we take a rising path to the left of the gully and from a position of vantage on the North side we see a winding valley with fairly steep sides and rounded hills intersected by gullies. Before us (South) and to the left (East) we see a steep gully, gorge or canyon with precipitous rocky sides. From our position we can also see two falls and there is a third further up-



Morialta Reserve looking South.

stream on the creek at our feet—Fourth Creek. We can notice a marked difference in the vegetation. Down stream, we see Red Gum (*Eucalyptus rostrata*) in and near the stream. On the lower slopes "Peppermint" (*Eucalyptus odorata*), and still further up the Yellow Gum (*Eucalyptus leucoxylon*). This view is presented in the block here reproduced from a photo kindly lent by the Tourist Bureau.

On the harder rocks grow the Grass trees (*Xanthorrhoea*) and She-oaks (*Casuarina*) with many hard and often spiny bushes.

We observe to the west, rounded hills of soft material—clay-stones, mud-stones, clay-slates, and shales, with characteristic vegetation. To the east hard rocks stand up in wall-like scarp-faces. The latter is a silicious rock.

These are good specimens of the two great classes of rock. The two commonest materials of which the earth's crust is built are *silica* (amounting in various forms to 75 per cent. of the rocks of the earth's surface) and clay, in which *alumina* is the chief basis.

Dealing first with the Quartz. Quartz is a very hard mineral, harder than steel. The blade of a good knife is probably about 5.5 on the scale of hardness, while quartz is 7. Its weight is less than three times the weight of an equal bulk of water.

You are familiar with quartz as a crystal (rock crystal) and as a white vein material occurring plentifully in the hills, and sometimes carrying gold. The hard rocks of the hills are almost entirely formed of it. Though quartz is very hard, it is not tough, and modern traffic reduces it to sand again.

Clay, clay-stones, mud-stones, clay-slates, on the other hand, are mostly soft. Kaolin (pure clay) is extremely soft, and the rocks formed from it are much softer than quartzite.

The gullies we see were entirely produced by the action of water wearing down the rocks through the abrasive work of the tools it carries, namely, pieces of quartzite. Striking gorges are often ascribed to volcanic and earthquake action, but this is scarcely ever the case. The whole of the landscape in the Mount Lofty Hills is due to the action of running water. In the soft lower part of the stream, especially in flood times, a great quantity of hard rock is carried down, which gradually deepens the stream bed, till it has produced the gorge you see at your feet. Streams are continually at work deepening and widening the valleys of the world.

Another great source of changes is found in the constant movement of the earth's crust. The rocks are continually moving up or down, but usually so slowly that the motion is imper-

ceptible. The Adelaide plains and hills are still rising. This movement not only results in raising or lowering great blocks, but also twists and contorts them into folds.

We may notice the crumples on the opposite hillside where the rocks have been bent up in a great fold (anticline), till the material, hard and strong as it was, could bend no longer and broke.

You can see that these hard quartzites have three sets of main joints, at right angles, so breaking the mass into roughly box-shaped divisions (cuboids), and producing the wall-like cliff as the rocks give way at the vertical joints.

Where a hard rock cuts across the course of the stream, the bed cannot be deepened so rapidly, and her falls are formed. Most of the falls in the world are produced in this way, Niagara, Victoria, etc. If you look at our first fall, you will see that the hard rock (quartzite) begins about 500 yards down. Here the fall began, much higher than it is now; higher even than the third fall is at the present time. The first fall then has cut its way back quite 500 yards, and probably down 200 feet since it began, long ago, to act as a fall. There has been little perceptible difference in 60 years. How long, then, must it have taken to wear back 500 yards? As Australian creeks can work well in flood time only, these falls must have been in existence an immense number of years to regress so far.

The work of a generation of patient investigators enables us to build up the natural history of such a valley as this.

We begin in the "Altheringa"—the dim past, the "once upon a time" of our dark brothers. This, our geologists call "Pre-Cambrian", the period when the oldest recognisable rocks were laid down. Life existed only in the sea, and perhaps consisted mainly of soft-bodied, jelly-like animals.

In these far-off days, probably from 500 to 1000 million years ago, possibly many times more, great mountain ranges, composed largely of quartz rocks, perhaps largely of granites and allied rocks, were worn down, and in the course of ages the quartz was weathered down to sand which accumulated in shallow waters till it must have been much over half a mile in thickness. Just think how long this must have taken. The great snow-clad mountains were worn down to stumps, and then to a rough plain (pene plain). The immense masses of sand were squeezed and crumpled by the movements of the earth, now elevated into ranges and now deep down and covered with fresh sediments which have since been completely worn away. The sandstone deep down in the earth becomes heated, squeezed and infiltrated with heated water containing fresh quartz in solution.

On cooling, through elevation, the particles of quartz become joined by fresh quartz, and the sandstone becomes the hard rock, quartzite, we see about us. We may see three divisions in this canyon. Above us the quartzites have been broken and worn and roughly re-united into grits. Below us we have fairly pure quartzite, hard, and penetrated by three sets of joint-planes, while below the cover of talus there is a third layer of quartzite, not quite so hard.

We have no record in these rocks of the events for the last 500 million years, but perhaps at that distance of time ice swept over the land, planing off the surface, depositing worn down morainic materials in the deep hollows. Since then, other rocks have been laid down again and again, and afterwards removed by denudation. Then about 250 to 300 million years ago came the second great ice age, the Permo-Carboniferous, of which traces are left at Hallett's Cove and in the valley of the Inman River.

Still a third ice-age passed over a large part of Australia possibly a million years ago, leaving many traces on Mount Kos-cuzisko, Tasmania, etc. Since that time the pene plain has been uplifted in great blocks. Some went up to form Mount Lofty. The Mount Lofty Ranges are recent, but the rocks of which they are composed are very ancient, being mainly Cambrian and pre-Cambrian, that is, the material is old—the form recent.

Mountains are formed in many ways. The Mount Lofty Ranges were formed by great crustal movements which led some of the rocks to move in great blocks, some sinking, some rising, many tilting in various directions. Some blocks went down below Adelaide. Some form the different levels of the Mount Lofty Highlands. The greatest differences show themselves along the front of the Ranges where a steep scarp face still exists. The work of rain, wind and streams has worn the steps into valleys, gorges and canyons such as this.

The weather loosens the blocks which fall into the valley and lie in big tumbled heaps at our feet. Further down they break up into shingle, then pebbles, and down in the Torrens Lake they form mud banks, some of the mud being taken down to the Reedbeds to trouble the householders there.

One of the many great uses of the hills is the magnificent water supply which Adelaide enjoys. Millbrook, Hope Valley, Thorndon Park, are all supplied from the Torrens, and great numbers of orchardists pump supplies from the river or the saturated gravels supplied by it.

Even the creek at our feet was at one time a not unimportant part of the city supply. Before it is too late, other picturesque areas should be acquired for the use of the South Australians that are to be.

W. Ham.

S.A. SHELL COLLECTORS' CLUB

The following shells were recently studied by this Club:—
FAMILY NASSARIIDAE.

Several members of this family inhabit the sandy shallow bays of our coastline. Just as the tide is making they may be noticed emerging from the sand, tentacles extended, moving around in all directions. The cancellated surface of the shell suggesting basket-work, accounts for their family name. Being carnivorous, voracious animals, well furnished with sharp radula, or teeth, the suspicion is well founded that they are responsible for great mortality, particularly among bivalve shells. A neat hole is soon drilled in the thin cockle shell, through which the soft parts are extracted. Two species are common in South Australia, viz:—

Nassarius pauperata, Lamarck. This is a solid little, short spired, cream colored specimen, faintly banded in brown, about 20 m.m. in length. Longitudinal beaded ridges cross the whorls. The outer lip is thickened and toothed. A broad patch of callus extends over the body whorl.

N. victorianus, Iredale. This handsome little shell is more elongated than the previous specimen, with certain differences in the aperture. The granulations do not appear so prominent. Several bright bands of reddish brown encircle the whorls.

Thousands of both these species of *Nassa* may be collected alive from beaches in the vicinity of the Outer Harbor—indeed it is probably the commonest shell in that locality.

N. burchardii, Philippi. A small *Nassa*, somewhat similar in appearance to *N. pauperata* inhabits parts of the Port Adelaide River.

FAMILY MURICIDAE.

This large family is represented in our waters by 25 or more species, including *Trophon*, *Typhis*, and *Xymene*. The typical *Murex* is a shell of three prominent varices, which extend either into spines, frills, ruffles, &c. These extensions are thickened during the resting period, and portions are dissolved if in such a position as to retard growth. A general collection of *Muricidae* presents wonderful variety of form of these processes,—some branch-like, others curved spines, and again with beautiful wing-like extensions.

Murex triformis, Reeve, is fairly common in our State. Average length of an adult specimen, $2\frac{1}{2}$ inches. The spire is sharp and elevated, three prominent wing-like varices, color, ashen-

grey; white within. The long canal is almost closed. A horny operculum closes the aperture. These shells may be taken alive from the *Pinna* beds outside the Outer Harbor.

M. angasi, Crosse, about $\frac{5}{8}$ of an inch in length, is not common. It is noted to have its spines projecting towards the spire.

Typhis yatesi. Crosse. Another member of the *Muricidae*, is a rare and unusual shell. Its tubular spines, round aperture, closed canal terminating in an upturned siphonal tube, constitute it a remarkable specimen much sought for by the conchologist. Several were dredged at a recent outing of the Field Naturalists Society in St. Vincent's Gulf.

FAMILY AMPHIBOLIDAE.

Shells belonging to this family inhabit salt marshes subject to tidal influence. They are adapted to living for long periods out of water, being able to breathe air. Closing its aperture with a thin, horny operculum, this shell at certain periods buries itself in the soft mud of the estuarine inlets. Young specimens exhibit rather pretty banded markings, but this soon gives place to the dingy, brown appearance of the typical adult.

Salinator fragilis, Lamarck, is very common in South Australia, and may be noticed in thousands crawling around on the surface of most of our tidal mud flats.

FAMILY SIPHONARIIDAE.

These cap shaped shells live between tide marks, attached to overhanging rocks, such as exist near the mouth of the Onkaparinga River. Being exposed to air for the greater part of their life, they are remarkable in having both gills and lungs, enabling them to live either in or out of water. 25 to 30 strong ribs, interspaced with smaller ridges, spread down from apex to base, and a deep siphonal groove is noticed on the right. It is thought that *Siphonariidae* are in an intermediary stage between marine and land life. Six members of this family are known in this State. The common variety:—

Siphonaria diemenensis, Quoy and Gaimard, lives on almost any sheltered rock between tide marks. Immense colonies are found in all shapes and sizes, corresponding, in many cases, to the particular irregularity of the rock on which they make their roost.

S. baconi, Reeve, is taken from rocks in Yorke Peninsula. It is a yellowish, translucent specimen, rather smaller and flatter than the preceding form.

F. TRIGG,

Hon. Secretary South Australian Shell Collectors' Club.
August 4th, 1927.

A MINERAL SPECIMEN.

—:O:—

By Dr. C. Fenner.

One raw and gusty day this winter, a band of hardy naturalists wandered over the bleak hilltops beyond the Warren Reservoir. These ranges are a veritable mine of rare and interesting minerals: feldspars, tourmaline, beryl, rutile, muscovite, and many others. During the excursion referred to, evidence was found of an extensive deposit of mineral that was being mined for some purpose. The mineral in question was quite undecomposed and with a beautiful appearance; the leader of the expedition was greatly puzzled to know exactly what the mineral was.

At first glance the lustre and cleavage suggested a coarse marble, and anyone would have been pardoned for declaring it was Calcite. The acid test showed, however, no "fizz." The second suggestion was based on the colour and cleavage; the cleavage was pronounced and the colour varied from almost transparent to translucent greens and purples. This looked like Fluorite, but fluorite rarely occurs in such great masses; further, the knife blade showed that the mineral was harder than fluorite. Closer examination showed what is called "lamellar twinning", this suggested Feldspar, but the mineral did not look like any well-known feldspar. So we left it at that, and submitted the specimen to Dr. L. Keith Ward for chemical analysis.

Dr. Ward has kindly reported as follows: "An analysis has been made of portion of the specimen obtained by you at the Warren Reservoir near Williamstown and left in this office. It appears to me to consist essentially of albite and quartz. The analytical results are:—Silica 72.38 per cent.; Alumina (including a little ferric oxide) 17.18 per cent.; Soda 8.30 per cent.; Potash .42 per cent.; Lime .20 per cent.; Magnesia .12 per cent.; Water, .70 per cent. You will no doubt remember that the South Australian petrographic province shows a marked tendency to develop albitic types of rock, whether in the plutonic or in the hypabyssal series. W. R. Browne comments on the albitic mica syenite of Rosetta Head in his paper on "The Igneous Rocks of Encounter Bay", printed in the Royal Society Proceedings for 1920, Vol. XLIV, pp. 21-25. C. E. Tilley discusses the dykes and veins of pegmatitic albitite in his paper on "The Petrology of the Granite Mass of Cape Willoughby, K.I., Part I", printed in the Royal Society Proceedings for 1919, Vol. XLIII, pp. 318-320 and 328-338 in a very detailed manner. R. Lockhart Jack has described dykes of albitite occurring at two places on Eyre Peninsula in Geological Survey Bulletin No. 3, pp. 15-16."

The astonishing thing about the mineral is its high content of Soda. The mineral consists mainly of the felspar called Albite, but albite, in common with albumen, Albion, and the Alps,—gets its name from its characteristic milk-white colour. Hence that consists mainly of the mineral albite. This occurrence is the confusion. It may be explained that “albitite” is a rock interesting from many points of view; as suggested by Dr. Ward, it may some day assist in correlating the ages of the greater rock groups of this State. In addition, such felspars have definite economic value. This note is penned to place on record the analysis given above, and also to enable the members of the excursion to name the specimens which most of them secured. 18/7/1927.

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EXCURSION TO WILLIAMSTOWN, JUNE 6, 1927.

Thirty members of the Field Naturalists' Society proceeded by charabanc to Williamstown to study the flora and the geology of that picturesque district by way of the Gorge road. A heap of road metal furnished evidence of the presence of an intrusive igneous rock, not unlike diorite, containing crystals of quartz, felspar, and mica. This rock is of rare occurrence in this neighborhood, being thrust up from below while in a molten state, and filling up the spaces and interstices in the layers deposited by water. In the bed of the creek, Professor J. B. Cleland, who conducted the botanical investigations, pointed out specimens of *Eucalyptus elaeophora* (oil bearing), seldom found so far south. After the South Para River and its tributary the Victoria Creek, had been crossed, the travellers reached Williamstown, turned to the right along the Kangaroo Gully road, leading to the Warren Reservoir in search of the quarry and pipeclay mine. Considerable quantities of this clay were at one time dispatched to Broken Hill. On the hillsides flakes of mica were found in great abundance, but not of a size to be of any commercial value. Some stones stained purple and green very much resembled fluorite, and bore curious marks not unlike Hebrew characters. Others consisted of green needle-shaped crystals, suggesting actinolite. These minerals were once in great demand in many manufacturing processes. Talc, from which is produced complexion talcum powder, was scattered about in some profusion. The rocks here were mostly sedimentary, but veins of quartz were plainly to be seen cutting through the softer strata. The layers had been tilted with a long gradual slope towards the east, and short abrupt face in the opposite direction. This folding and uplifting had produced the many spurs of the Mount Lofty

and Barossa hills. Through the steep western scarp the rivers had cut their channels, and scooped out their valleys, and rains and stream had worn down and rounded the rugged ridges. The vegetation and soil, included *E. leucoxylon* (yellow gum), often known as blue gum, *Casuarina* (sheoak), *Banksia* (honey-suckle), and great numbers of grass trees (*Xanthorrhoea*). Special attention was drawn by Professor Cleland to the native currant (*Acrotriche depressa*), a shrub which bears berries about the size of a small currant, of rich purple tint. This fruit contains a large percentage of iron, and is deemed to possess valuable tonic properties. For this reason it is much sought after in the season, but unfortunately is threatened with extinction by picnickers and others. One of the main objects of the excursion was to enlist public sympathy in the protection of this useful shrub, which is found in only a very few localities. It was suggested that landowners and lessees in the district might do much to save the plant, and that all Nature lovers might contribute their share to the same object.

EXCURSION TO HENLEY BEACH, JULY 9, 1927.

A small party reconnoitred the beach northward from Grange. Attention was drawn by Mr. F. Trigg to certain peculiar marks almost semi-circular, these curving lines being explained as the handiwork of tiny bivalves known as *Mesodesma*, belonging to the *Pelecypoda* (axe footed), which, opening their valves, plough those furrows in the sand. The vibrations of the tides rouse them to activity, and they set out to meet the advancing water. The Periorstracum, or outer testa or shell, differs from that of other Testaceans in containing a much smaller percentage of carbonate of lime and more animal matter, the usual amount of the former substance in this family being as high as 95 per cent. *Arca trapexia* was at one time abundant on our southern coasts, but is found now only in a subfossil form in these waters. This fact led to a digression on the frequent migrations of living species, including man,—migrations known to science as "Diaspora." These dispersions are brought about by many causes, such as the incursions of predatory species or the failure of the food supply. But the most potent urge is found in change of climate. In the case of the *Arca* the latter reason is given for the migration to the tropical seas of Queensland and Western Australia, where living specimens abound. And as in all such movements millions perish, so these hapless creatures, unable to cross the cold waters of the Bight, left their remains in the sands and sea-wrack along our southern coast as far west as Streaky Bay, and are found only in this subfossil form. Another interesting find was a conglomeration of egg gcapsules, which Mr. W. J. Kimber maintained

was the deposit of but one Cephalopod or Sepia. The capsules numbering perhaps 500 were held together by a glutinous web, each capsule containing three tiny ova, and in some cases a living embryonic organism. This abundance of eggs laid by one individual is one instance among many of Nature's provision for the continuance of a species. The young cephalopods are dainty morsels much relished by denizens of the sea, both small and great, and but for their high birthrate would soon be exterminated. But when she has deposited the eggs the female cephalopod considers her duty to her offspring has been fulfilled, and the minute creatures are then left to fend for themselves. Another instance was supplied by a kind of ribbon of sand and lime, cemented together, resembling a fragment of motor tyre. This substance contained countless eggs of the *Natica*, and is designated the Nidus (or nest). A peculiar phenomenon of oyster life was illustrated in the spoils secured. To the larger shell were fastened several smaller halves of bivalves. The large oyster anchors itself to a mangrove or other object, and these smaller relations fasten upon its shell. There they remain immovable and feast in common on what the waters bring—a type of Socialistic community without any incentive to effort, and a consequent arrest of development. A cup-shaped sponge was picked up in which a tiny crab seeks refuge from his foes, who take no interest in an apparently tasteless, indigestible object floating in the water, while they are unaware of the dainty thus concealed. Mr. Godfree commented on the pleasure and information to be derived from the bi-weekly meetings of the "Shell Club," and the agreeable social intercourse at these reunions.

EXCURSION TO BLACK HILL, JULY 30, 1927.

Black Hill bordering the Montacute road, though apparently barren and forbidding, is to the botanist, the geologist, and other nature lovers, one of the most interesting spots within easy reach of the city. From the steep slopes a magnificent panorama of the fertile Adelaide plains is unfolded. The botanical research was under the leadership of Professor C. B. Cleland and Mr. E. H. Ising. The vegetation on the hill is in sharp contrast to that of some of the neighbouring peaks. The plants here are Xerophytic in nature, that is, loving dry soils. A thin layer of hungry sand covers a mass of quartzite. Spiny bushes like *Xanthorrhoea* (grass tree), *Hakea ulicina*, *Astroloma*, *Acacia*, *Andropogon*, *Iso-pogon*, *Armata* (prickly acacia), and others of a like character abound. The grass tree gum has a commercial value, being used in the manufacture of picric acid, an ingredient in explosives. Also the gum is used as a varnish for linoleums and for other purposes. The dainty little *Drosera*, both *Whittakeri* and *Menziesii*,

were found near the foot of the hill. The golden blossoms of *Acacia pycnantha* (golden wattle) and the brilliant purple of *Hardenbergia* (native lilac) added a touch of vivid colouring to the sombre landscape and blended pleasingly in the bouquets. *Grevillea*, with its long pink stamens, *Daviesia*, and *Hibbertia* (guinea flower) also formed a charming harmony. Further up near the summit crimson, pale pink, and snowy white heaths (*Epacris*) were eagerly sought. *Pimelea Spatulata* of a creamy white, *Calythrix*, *Tetragona*, *Astroloma conostephioides*, and the delicate *Hybanthus floribundus*, *Haloragis*, *Luzula*, *Campestris*, *Amarylla*, *Lepidosperma*, *Cassytha*, *Lobelia* were identified. Many of the eucalypts were suffering seriously from the growth of the mistletoe (*Loranthus pendulus*), which had almost drained the life of their unhappy hosts. Two species of fungi were identified by Professor Cleland, *Lacbaria lacbata* and *Paxillus*. The geology or rather the physiography of this locality presents many features well worth prolonged investigation. At the foot of the hill Dr. Fenner pointed out a good example of a fan delta formed by the deposit of material brought down by the rains and streams of centuries, first the rock fragments being dropped, then the gravel after this the sand is laid down in successive layers, and finally the mud which the slowly moving water can no longer hold in solution. The line of cleavage between the original rock and these deposits could be clearly traced. Half-way up the hill a narrow col or saddle was being eaten away on both sides by two small tributaries of the creek.

The name "Black Hill" is due to the dark appearance of the comparatively thick covering of vegetation that grows on this hill, and this in turn is a reflection of the geological structure. Black Hill is possibly unique among the larger hills of the Mount Lofty Ranges in that it consists wholly of massive quartzites. These quartzites are highly resistant to ordinary processes of erosion, thus causing the hill to stand out from its neighbours. The quartzite beds dip at high angles and are intensely jointed and fractured.

It may be explained that a quartzite is a rock that was originally an ordinary sediment,—a sandstone. In this case it was a Cambrian sandstone, laid down in the shallow seas or bays of that period, possibly some 600 or 800 million years ago. During the long periods of uplifts and down-wearing, of folding and faulting, of mountain-building and plain-making, that have taken place since then, the ancient sandstones have undergone an important kind of change,—of metamorphosis. They have been penetrated by quartz-bearing solutions for long ages, under con-

ditions (deep-seated) very different from those that now prevail. These siliceous solutions have cemented the sand grains together with silica or quartz cement. So that now the whole rock is a mass of solid quartz—a quartzite, and one cannot tell the original quartz grains from the latter quartz cement, except in a thin rock slice under the microscope.

Quartzites, on weathering, give a very sandy soil,—a soil very absorbent of water. Thus Black Hill, while in an area of relatively high rainfall, is potentially in a much drier area,—for it cannot store and utilize its rainfall as it might otherwise do. In these seasons the hill is more than usually sensitive to variations of sun and shade. Thus the vegetation shows remarkable variations according to its aspect or angle or slope relative to the sun,—a matter which must add largely to the interest of a botanical survey of the hill.

Physiographically, Black Hill possibly forms a separate fault block,—a portion of the main uplifted area (horst) of the Mount Lofty Ranges; the valley of the adjoining creek on the south appears to mark a fault junction. The main western front of the hill has been formed by the weathering back of the main fault scarp of the Mount Lofty Ranges; this abuts on the plunging and tilted Para fault block.

The foot of Black Hill is overlaid with thick accumulations of fault-apron alluvial and fan-delta deposits. These deposits lie at a more gentle angle than the main hill but are equally porous; they should, however, provide some distinct differences of vegetation, even though this is not apparent on a first analysis. Fortunately, from its character, this hill is not worth "clearing," and is thus likely to remain for some time as a natural fauna and flora reserve.

EXCURSION TO ENFIELD, AUGUST 13, 1927.

Not far from the terminus of the Enfield tram is a patch of native virgin scrub, a quite unexpected sight in a neighbourhood so populous. Under the guidance of Mr. E. H. Ising and Professor J. B. Cleland, a small party of field naturalists proceeded to explore this interesting spot. Various species of wattle were in full bloom, including *Acacia obliqua* with its dainty racemes, and the golden glory of *A. pycnantha*, also *Acacia ligulata*. Several species of eucalypts formed a pleasing foil with their sombre foliage. *E. odorata*, *E. oleosa* (a mallee) were among the number. There were many native pines (*Callitris robusta*) adding variety to the woodland scene. The graceful *Exocarpa spartia* (drooping wild cherry) and *Cassia sturtii* were also observed. *Myoporum viscosum* (false sandalwood), *Rhagodia* (berry bush), with its brightly coloured fruit, *Bursaria spinosa* (thorny-purse bush), *Senecio laetus*, *Anguillaria dioica*, *Hypoxis glabella* came under

notice. The beautiful purple flowers of *Hardenbergia* (native lilac) caught the eyes of the wanderers, and the delicate creamy white petals of *Clematis wormbea*, also *Lomandra dura* and *Goodenia viadina*, *Daucus brachiatus* were found. It was rather early for orchids, but Mr. Ising found some greenhoods (*Pterostylis*). The billybutton (*Craspedia richii*), *Solanum* (night shade), *Stackhousia* and *Stipa*, with its innumerable hairs, which hold the dew drops to the morning light like glittering diamonds, were plentiful. It is suggested that this delightful remnant of the native scrub should be preserved for all time by being secured as a public reserve.

OUR EXCHANGES.

1. The Victorian Naturalist, for May, and June, 1927.
Mr. Pescott continues his account of the Orchids of Victoria, in the course of which he pays a glowing tribute to the fine work of Dr. S. R. Rogers.
2. The Australian Naturalist.
The four numbers of Volume 6 are full of interesting articles by members of the Naturalists' Society of N.S.W.
3. The South Australian Ornithologist for April and July 1927.
4. The Australian Museum Magazine.
Mr. T. G. Campbell writes on Water Bugs in a very interesting style, with many quotations from the work of our Mr. Hale who has made a particular study of this part of Natural history.
5. The Australian Forestry Journal for April, 1927.

"A CRUISE AMONG FORMER CANNIBAL ISLANDS."

Dr. Alfred W. Hill who so kindly entertained members of the Section at his house on May 21st, also presented each of his guests with a copy of his book on Fiji, Tonga, and Samoa. The little brochure is a brightly written and profusely illustrated account of these Pacific Islands, dealing with the people of the islands, their customs and legends.

NOTES AND QUERIES.

The editor of the "S.A. Naturalist" would be glad to receive any queries regarding any branch of natural history. He would be pleased to receive notes on any such subjects, particularly when embodying any original observations.

MICROSCOPY.

Mr. Harding (c/o A. W. Barlow, Pt. Adelaide) would be glad to receive the names of any members interested in Microscopy with a view to reviving the Microscopic branch of the F.N.S. A number of microscopes and slides would be available for the branch if members who are interested in this fascinating branch of natural history will communicate with Mr. Harding and form a club.

